

FEB 1  
CRPL-F161 PART A

FOR OFFICIAL USE

PART A  
IONOSPHERIC DATA

ISSUED  
JANUARY 1958

U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO



CRPL-F 161  
PART A

NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO

Issued  
22 Jan. 1958

## IONOSPHERIC DATA

### CONTENTS

	<u>Page</u>
Symbols, Terminology, Conventions . . . . .	2
Predicted and Observed Sunspot Numbers. . . . .	5
World-Wide Sources of Ionospheric Data. . . . .	6
Examples of Ionospheric Vertical Soundings Baguio, P.I.; July 23, 1957 . . . . .	8
Tables of Ionospheric Data. . . . . . . . .	10
Graphs of Ionospheric Data. . . . . . . . .	20
Index of Tables and Graphs of Ionospheric Data in CRPL-F161 (Part A). . . . . . . . .	50

## SYMBOLS, TERMINOLOGY, CONVENTIONS

Beginning with data reported for January 1952, and continuing through December 1956, the symbols, terminology, and conventions for the determination of median values used in this report (CRPL-F series) conform as far as practicable to those adopted at the Sixth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Geneva, 1951. Excerpts concerning symbols and terminology from Document No. 626-E of this Meeting are given on pages 2-7 of the report CRPL-F89, "Ionospheric Data," issued January 1952. Reprints of these pages are available upon request.

Beginning with data for January 1957, the symbols used are given in NBS Report 5033, "Summary of Changes in Ionospheric Vertical Soundings, Observing and Scaling Procedures - Effective 1 January 1957," which draws upon the First Report of the Special Committee on World-Wide Ionospheric Soundings (URSI/AGI), Brussels, Sept. 2, 1956. A list of these symbols is available upon request.

In the Second Report of the Special Committee on World-Wide Ionospheric Soundings of the URSI/AGI Committee, May 1957, a new descriptive letter was introduced:

M Measurement questionable because the ordinary and extraordinary components are not distinguishable.

There was an expansion in meaning of the following:

Z (1) (qualifying letter) Measurement deduced from the third magnetoionic component.  
(2) (descriptive letter) Third magnetoionic component present.

Beginning with data for January 1945, median values are published wherever possible. Where averages are reported, they are, at any hour, the average for all the days during the month for which numerical data exist.

The following conventions are used in determining the medians for hours when no measured values are given because of equipment limitations and ionospheric irregularities. Symbols used are those given above.

a. For all ionospheric characteristics:

Values missing because of A, C, F, H, L, N, R or S are omitted from the median count.

b. For critical frequencies and virtual heights:

Values of foF2 (and foE near sunrise and sunset) missing because of E are counted as equal to or less than the lower limit of the recorder. Values of h'F (and h'E near sunrise and sunset) missing for this reason are counted usually as equal to or greater than the median. Other characteristics missing because of E are omitted from the median count.

Values missing because of G are counted:

1. For foF2, as equal to or less than foF1.
2. For h'F2, as equal to or greater than the median.

The symbol W is included in the median count only when it replaces a height characteristic; the descriptive symbol D, only when it replaces a frequency characteristic.

Values missing for any other reason are omitted from the median count.

c. For MUF factor (M-factors):

Values missing because of G or W are counted as equal to or less than the median.

Values missing for any other reason are omitted from the median count.

d. For sporadic E (Es):

Values of fEs missing because of E or G are counted as equal to or less than the median foE, or equal to or less than the lower frequency limit of the recorder.

B for fEs is counted on the low side when there is a numerical value of a higher layer critical frequency; otherwise it is omitted from the median count.

S for fEs is counted on the low side at night; during the day it is omitted from the median count (beginning with data for November 1957).

Values of fEs missing for any other reason, and values of h'Es missing for any reason at all are omitted from the median count.

Beginning with data for November 1945, doubtful monthly median values for ionospheric observations at Washington, D.C., are indicated by parentheses, in accordance with the practice already in use for doubtful hourly values. The following are the conventions used to determine whether or not a median value is doubtful:

1. If the count is four or less, the data are considered insufficient and no median value is computed.

2. For the F2 layer, h'F or foEs, if the count is from five to nine, the median is considered doubtful. The E and F1 layers are so regular in their characteristics that, as long as the count is at least five, the median is not considered doubtful. A count of at least 5 is considered sufficient for an h'Es median.

3. For all layers, if more than half of the data used to compute the medians are doubtful (either doubtful or interpolated), the median is considered doubtful.

The same conventions are used by the CRPL in computing the medians from tabulations of daily and hourly data for stations other than Washington, beginning with the tables in IRPL-F18.

Ordinarily, a blank space in the fEs or foEs column of a table is the result of the fact that a majority of the readings for the month are below the lower limit of the recorder or less than the corresponding values of foE. Blank spaces at the beginning and end of columns of h'F2 or h'F1, foF1, h'E, and foE are usually the result of diurnal variation in these characteristics. Complete absence of medians of h'F1 and foF1 is usually the result of seasonal effects.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

- a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.
- b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.
- c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.
- d. The tables may contain median values of either foEs or fEs. The graph of median Es corresponds to the table. Percentage curves of fEs are estimated from values of foEs when necessary.

## PREDICTED AND OBSERVED SUNSPOT NUMBERS

The following predicted smoothed 12-month running-average  
 "Zürich sunspot numbers were used in constructing the contour charts:

Month	Predicted Sunspot Number										
	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948
December	150*	150	42	11	15	33	53	86	108	114	
November	150*	147	35	10	16	38	52	87	112	115	
October	150*	135	31	10	17	43	52	90	114	116	
September	150*	119	30	8	18	46	54	91	115	117	
August	150*	105	27	8	18	49	57	96	111	123	
July	150*	95	22	8	20	51	60	101	108	125	
June	150*	150*	89	18	9	21	52	63	103	108	129
May	150*	150*	77	16	10	22	52	68	102	108	130
April	150*	150*	68	13	10	24	52	74	101	109	133
March	150*	150*	60	14	11	27	52	78	103	111	133
February	150*	150*	53	14	12	29	51	82	103	113	133
January	150*	150*	48	12	14	30	53	85	105	112	130

\*This number is believed representative of solar activity at a maximum portion of the current sunspot cycle.

The latest available information follows concerning the corresponding observed Zürich numbers beginning with the minimum of April 1954. Final numbers are listed through June 1956.

### Observed Sunspot Number

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1954				3	4	4	5	7	8	8	9	12
1955	14	16	19	23	29	35	40	46	55	64	73	81
1956	89	98	109	119	127	137	145	148	149	154	157	162
1957	169	171	174	181	186	188						

## WORLD - WIDE SOURCES OF IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 60 and figures 1 to 119 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL prediction of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

**Commonwealth of Australia, Ionospheric Prediction Service of the Commonwealth Observatory:**  
Canberra, Australia

**Australian Department of Supply and Shipping, Bureau of Mineral Resources, Geology and Geophysics:**  
Watheroo, Western Australia

**University of Graz:**  
Graz, Austria

**Meteorological Service of the Belgian Congo and Ruanda-Urundi:**  
Elisabethville, Belgian Congo  
Leopoldville, Belgian Congo

**Escola Politecnica, University of Sao Paulo:**  
Sao Paulo, Brazil

**British Department of Scientific and Industrial Research, Radio Research Board:**  
Ibadan, Nigeria (University College of Ibadan)  
Inverness, Scotland  
Singapore, British Malaya  
Slough, England

**Defence Research Board, Canada:**  
Churchill, Canada  
Resolute Bay, Canada

**Instituto Geofisico de Los Andes Colombianos:**  
Bogota, Colombia

**Danish National Committee of URSI:**  
Godhavn, Greenland

**General Direction of Posts and Telegraphs, Helsinki, Finland:**  
Nurmijarvi, Finland

**Central Institute of Meteorology, Budapest, Hungary:**  
Budapest, Hungary

Ministry of Postal Services, Radio Research Laboratories, Tokyo,  
Japan:

Akita, Japan  
Tokyo (Kokubunji), Japan  
Wakkai, Japan  
Yamagawa, Japan

Christchurch Geophysical Observatory, New Zealand Department of  
Scientific and Industrial Research:

Campbell I.  
Cape Hallett (Adare)  
Christchurch, New Zealand  
Rarotonga, Cook Is.  
Scott Base

Norwegian Defence Research Establishment, Kjeller per Lillestrom,  
Norway:

Oslo, Norway  
Tromso, Norway

Manila Observatory:

Baguio, P. I.

Institute of Terrestrial Magnetism, Ionosphere and Radio Propa-  
gation, Moscow, U.S.S.R.:

Alma-Ata  
Moscow  
Providenie Bay  
Simferopol  
Sverdlovsk  
Tomsk

Pakistan Meteorological Service:

Quetta, Pakistan

South African Council for Scientific and Industrial Research:  
Capetown, Union of South Africa

Research Institute of National Defence, Stockholm, Sweden:  
Upsala, Sweden

United States Army Signal Corps:

Fletchers Ice I.  
Ft. Monmouth, New Jersey  
Grand Bahama I.  
St. John's, Newfoundland  
Thule, Greenland

National Bureau of Standards (Central Radio Propagation Labora-  
tory):

Maui, Hawaii  
Panama Canal Zone  
Point Barrow, Alaska  
San Francisco, California (Stanford University)  
Washington, D. C.

## EXAMPLE OF IONOSPHERIC VERTICAL SOUNDINGS

Baguio, July 23, 1957  
 (Geomagnetic Latitude 5°N)

The following ionograms were obtained at the Baguio, Philippines vertical sounding station (operated by Manila Observatory). They are typical of day and night conditions for July at this geomagnetic latitude. Ionospheric data are scaled directly from these records onto the daily f-plot, a graph of frequency characteristics vs. time. The f-plot for the day represented by these soundings is found on the following page. Medians as found in the Tables of Ionospheric Data are calculated using hourly values taken from the f-plot or directly from the ionogram.

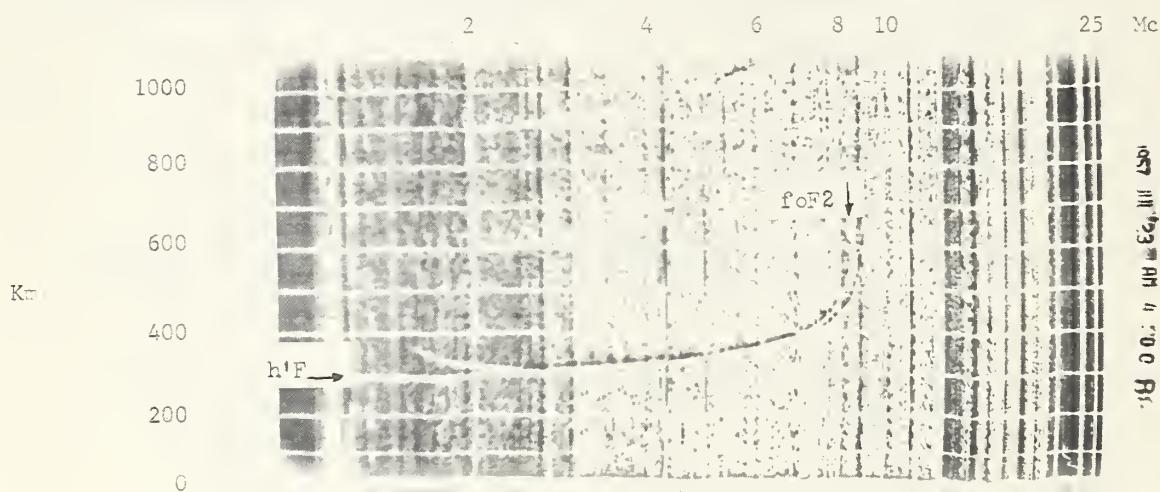


Fig. A. Baguio, P. I. July 23, 1957, 0400 hours, 120°E time.

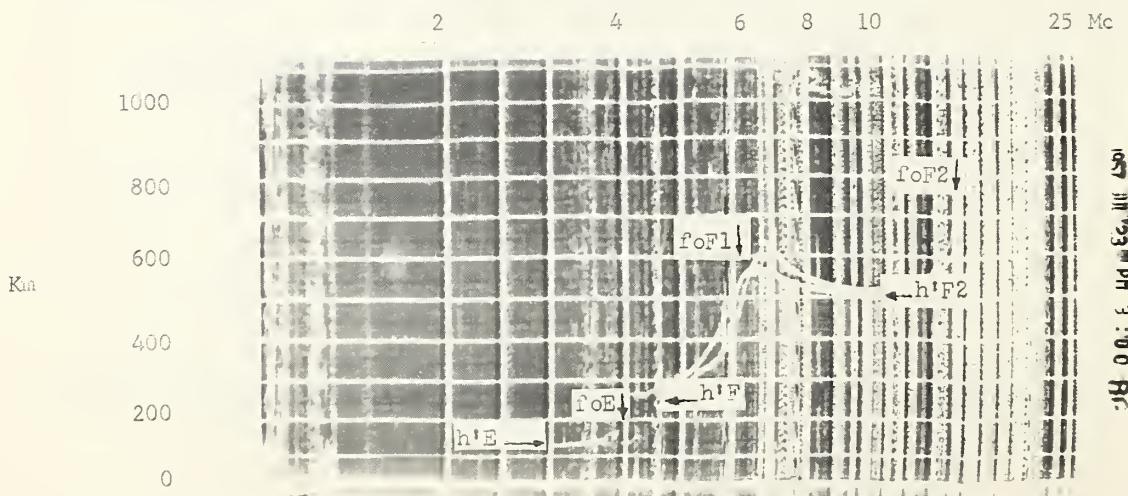
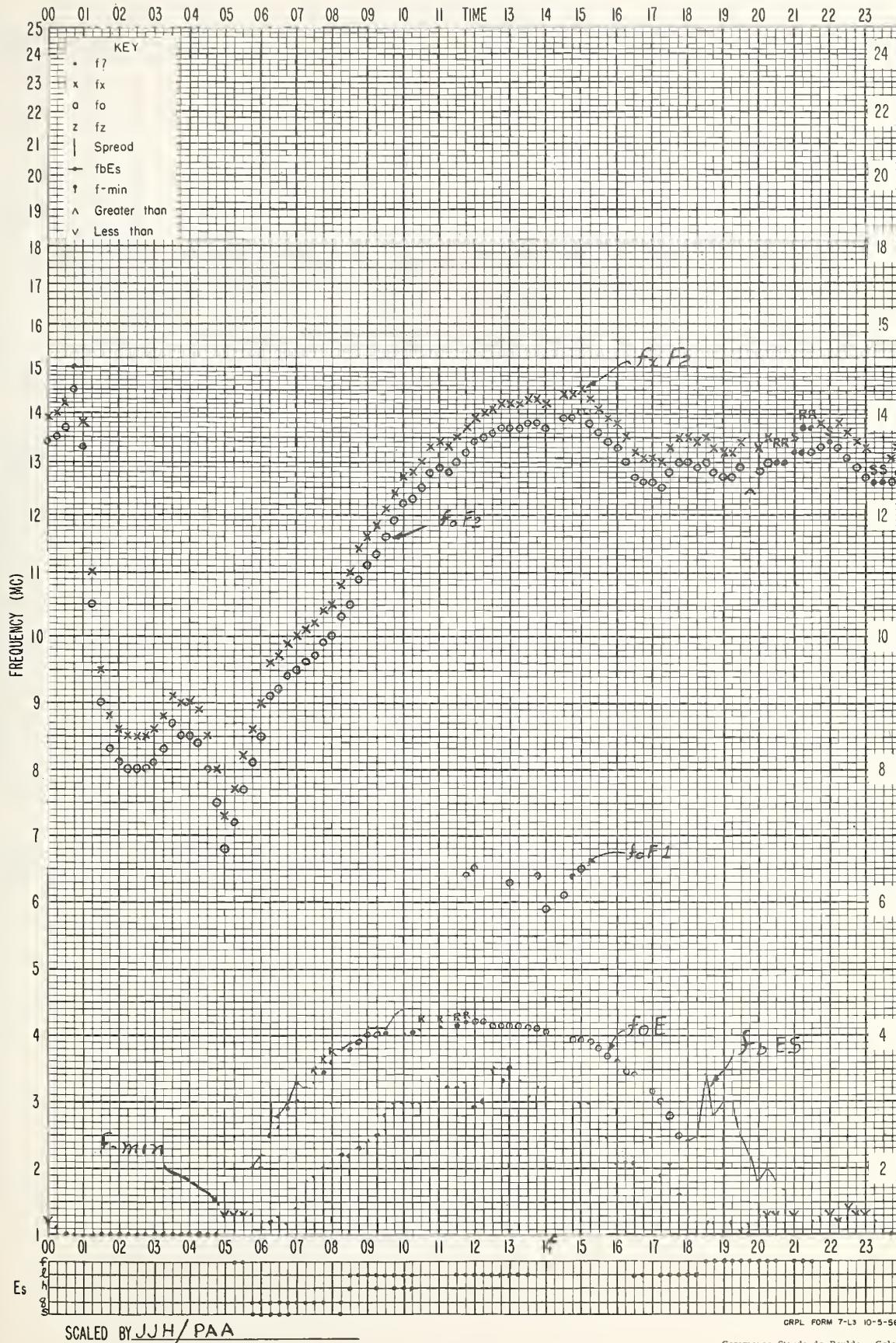


Fig. B. Baguio, P. I. July 23, 1957, 1500 hours, 120° time.

STATION ION BG

## f - PLOT OF IONOSPHERIC DATA

DATE 23 JULY 1957



SCALED BY JJH / PAA

# TABLES OF IONOSPHERIC DATA

10

Table 1

Time	October 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00	5.2	340				3.0	2.4
01	4.9	335				3.0	2.4
02	4.5	320				3.1	2.4
03	4.2	315				3.0	2.4
04	4.2	300				3.1	2.4
05	4.2	290				3.2	2.4
06	5.2	275			E	3.4	2.6
07	7.5	245			130	1.80	4.2
08	10.3	240			115	2.50	3.8
09	12.7	240			110	2.85	4.8
10	(270)	13.5	235	5.3	110	3.10	5.0
11	(265)	13.5	230	(5.5)	110	3.20	5.1
12	270	14.2	230	5.6	110	3.20	4.3
13	(280)	14.1	235	(5.5)	110	3.15	4.0
14	---	13.7	235	---	110	3.00	3.3
15	13.2	240			115	2.65	3.4
16	12.9	240			130	2.00	3.2
17	12.0	240			E	3.2	2.8
18	10.6	230			E	3.1	2.8
19	9.0	240				3.1	2.8
20	7.6	245				3.0	2.7
21	7.0	280				2.6	2.55
22	6.1	305				3.0	2.4
23	5.5	340				2.7	2.45

Time: 15.0°E.

Sweep: 1.4 Mc to 17.0 Mc in 6 minutes, automatic operation.

Table 2

Time	October 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00						>7.0	365
01						6.9	350
02						6.6	370
03						(6.4)	375
04						6.3	350
05						(6.0)	310
06						6.8	300
07						>9.0	250
08						>9.8	250
09						>10.5	240
10						>10.4	250
11						>10.4	250
12						>10.5	250
13						>10.2	250
14						>10.4	250
15						>10.4	250
16						>10.0	250
17						>9.4	260
18						>9.4	275
19						>9.2	270
20						(8.6)	280
21						(8.4)	300
22						(7.8)	340
23						(7.3)	340

Time: 15.0°E.

Sweep: 2.5 Mc to 11.5 Mc in 2 minutes.

Table 3

Time	September 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00	5.8	(275)					2.70
01	6.4	<270					2.65
02	6.4	<280					2.60
03	7.0	<270					2.70
04	6.4	265					2.65
05	6.7	<270					2.75
06	6.8	<275					2.70
07	6.3	(265)					2.80
08	6.7	<275					2.75
09	6.6	(260)					2.75
10	7.0	<300					2.75
11	6.9	<275					2.70
12	7.0	<290					2.75
13	7.4	<300					2.70
14	(370)	7.2	<275				2.70
15	(410)	7.1	<280	4.1			2.60
16	(390)	7.0	<295				2.65
17	6.8	<300					2.70
18	6.6	<300					2.70
19	6.4	<300					2.65
20	6.8	<300					2.65
21	6.7	(270)					2.70
22	6.6	(270)					2.75
23	5.8	<270					2.70

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

\*Preliminary estimated average position.

Table 4

Time	September 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00			(5.3)	(350)			3.7 (2.40)
01			(5.1)	390			3.3 (2.35)
02			4.9	(355)			4.0 2.20
03			(4.9)	345			3.5 (2.55)
04			5.5	310			3.5 (2.55)
05			5.9	290		1.90	2.4 2.70
06			6.2	265	110	2.30	2.70
07			6.5	255	130	2.70	2.70
08			7.2	250	110	2.80	2.65
09			8.2	250	120	3.00	2.70
10			8.5	250	115	3.10	2.70
11			8.6	245	110	3.15	2.65
12			(360)	8.7	110	3.20	2.70
13			8.7	250	115	3.15	2.70
14			8.0	250	115	3.05	2.70
15			7.0	250	120	3.00	2.80
16			7.0	250	115	2.70	2.75
17			(255)	7.0	260	130	2.50
18			6.4	275	130	2.10	2.70
19			6.0	295			3.8 2.70
20			5.8	(305)			3.9 2.50
21			5.6	(330)			4.2 2.50
22			(5.7)	(345)			4.0 (2.50)
23			(5.5)	(320)			4.0 -----

Time: 15.0°E.

Sweep: 0.7 Mc to 25.0 Mc in 5 minutes, automatic operation.

Table 5

Time	September 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00	6.3	300					2.50
01	5.8	300					2.40
02	5.5	300					2.40
03	4.9	300			1.3		2.40
04	4.3	300					2.40
05	4.2	290					2.55
06	5.2	275			(1.95)		2.80
07	6.2	250			115	2.50	2.80
08	7.2	250			110	2.85	2.80
09	7.6	245			110	3.25	2.70
10	8.0	240	4.50	110	3.40		2.70
11	8.8	240	4.40	105	3.60		2.70
12	(660)	9.6	240	4.60	110	3.60	2.70
13	9.4	240			110	3.60	2.70
14	9.6	240	4.95	110	3.50		2.70
15	9.2	250			110	3.30	2.70
16	9.5	250			115	3.05	2.75
17	9.6	250			2.65		2.80
18	9.7	250			2.30		2.80
19	9.4	250			1.7		2.70
20	8.4	250			1.6		2.70
21	8.1	250			2.0		2.70
22	6.9	260			1.6		2.55
23	6.8	290			2.45		2.45

Time: 15.0°E.

Sweep: 0.7 Mc to 25.0 Mc in 5 minutes, automatic operation.

Table 6

Time	September 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	fEs (M3000)F2
00			6.4	305			2.60
01			6.0	300			2.60
02			5.8	290			2.60
03			5.3	270			2.70
04			4.4	275			2.70
05			5.0	280			2.80
06			6.8	245	120	2.60	3.05
07			8.6	240	118	(3.05)	3.10
08			9.3	230	115	(3.40)	3.00
09			10.0	220	5.1	111 (3.70)	2.90
10			9.8	225		111 (3.90)	2.85
11			(540)	10.0	230	5.5	111 (3.85)
12			(460)	9.8	225	5.4	109 (3.90)
13			(455)	9.7	230	109	3.80
14			(430)	9.7	230	5.7	111 (3.60)
15			9.9	230		115	3.30
16			10.0	240		118 (3.00)	2.75
17			10.2	255		128 (2.50)	2.80
18			10.2	250			2.90
19			9.2	250			2.80
20			8.6	250			2.70
21			7.6	270			2.65
22			7.0	285			2.60
23			6.7	300			2.55

Time: 60.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 7

Washington, D. C. (38.7°N, 77.1°W)							September 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00		6.7	300					2.55
01		6.5	295					2.55
02		5.7	<290					2.60
03		5.6	290					2.60
04		5.2	270					2.65
05		5.0	270					2.70
06		6.0	265		117	1.90		2.90
07	---	8.0	240	4.0	111	2.70		3.10
08	G	9.4	235	4.7	109	3.30		3.05
09	(490)	10.1	230	5.0	109	3.70		2.90
10	(610)	10.4	220	5.3	109	(3.90)		2.80
11	370	10.4	220	5.3	109	(4.00)		2.70
12	485	10.2	230	5.0	109	(4.00)		2.70
13	395	10.2	230	5.1	109	4.00		2.65
14	360	10.4	230	5.2	109	(3.90)		2.60
15	410	10.2	235	(5.0)	109	3.65		2.65
16	(435)	10.0	240	4.8	109	3.30		2.70
17	(440)	10.0	250	---	118	2.80		2.70
18		9.8	250	---	---	---		2.80
19		9.2	240					2.75
20		8.2	250					2.70
21		7.6	260					2.70
22		7.1	270					2.65
23		6.8	280					2.60

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 9

Panama Canal Zone (9.4°N, 79.9°W)							September 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00		11.0	245			(2.2)		2.90
01		9.6	240			(1.8)		2.90
02		7.8	225					2.75
03		7.0	235					2.85
04		6.0	240	---	---	1.9		2.80
05		5.2	250	---	---	2.2		2.60
06		5.6	300	---	---			2.70
07		9.0	250		111	(2.55)		2.95
08		10.7	240		110	(3.35)		2.90
09		12.0	225		109	3.80		2.75
10	---	13.0	230		109	4.15	4.2	2.70
11	(410)	13.5	230	---	109	4.30		2.65
12	395	13.6	225	---	108	4.35		2.60
13	395	13.9	220	---	109	4.35		2.60
14	390	14.0	230	---	109	4.25		2.60
15	380	13.8	230	---	109	4.00	4.4	2.60
16	370	13.2	235	---	109	3.65	4.0	2.60
17		13.0	245		109	(3.00)	3.4	2.65
18		12.2	250	---	---	---	2.2	2.70
19		12.0	260				3.6	2.70
20		12.2	270					2.70
21		12.0	260				2.8	2.70
22		11.8	255					2.80
23		10.9	255					2.85

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 11

Elisabetville, Belgian Congo (11.6°S, 27.5°E)							September 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	230	7.0						2.47
01	250	6.1						2.56
02	250	5.4						2.62
03	240	4.8						2.74
04	265	6.2						2.70
05	240	9.7	---	---	120	2.8	3.1	2.90
06	250	10.9	240	---	110	3.5	3.6	2.76
07	260	11.8	235	---	110	3.9		2.63
08	290	12.5	230	---	110	4.0		2.52
09	315	12.4	230	---	105	4.1	4.6	2.41
10	380	12.1	250	---	105	4.1		2.30
11	395	12.3	250	6.6	105	4.1	4.6	2.23
12	400	12.5	245	---	110	4.0	4.7	2.20
13	390	12.4	240	---	110	3.9	4.0	2.19
14	370	12.6	245	---	115	3.5	4.0	2.21
15	350	12.7	250	---	120	3.0	3.6	2.28
16	280	12.8		---	---	3.0		2.37
17	280	13.3				2.8		2.45
18	265	14.5						2.52
19	235	14.5						2.60
20	230	13.0						2.59
21	230	11.7						2.61
22	230	10.9						2.66
23	220	8.0						2.64

Time: 0.0°W.

Sweep: 1.0 Mc to 20.0 Mc in 7 seconds.

Table 8

Maui, Hawaii (20.8°N, 156.5°W)							September 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2
00			9.0		255			2.1
01			8.6		260			2.85
02			8.2		260			2.80
03			6.6		265			2.80
04			5.9		270			2.75
05			5.2		270			2.70
06			5.4		310			2.70
07			8.3		250		131	1.6
08	(260)		10.0		240		119	2.50
09			11.0		230		111	3.20
10	(580)		12.3		230		111	4.1
11			13.2		235		111	4.4
12			14.0		230		111	4.35
13			14.5		235		115	4.4
14			14.6		240		115	4.4
15			14.4		235	(6.0)	115	4.00
16			15.0		240		114	4.1
17			13.5		255		117	3.10
18			13.1		260		121	2.30
19			12.8		260			3.9
20			12.2		270			2.75
21			12.0		280			3.8
22			11.8		275			2.80
23			11.0		260			3.2

Time: 150.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 10

Leopoldville, Belgian Congo (4.4°S, 15.2°E)							September 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00		220	10.6					2.61
01		230	9.5					2.54
02		235	9.0					2.63
03		230	7.9					2.83
04		230	5.1					2.85
05		255	7.0				1.9	3.0
06		245	10.0		240		120	3.0
07		260	11.3		235		110	3.7
08		280	12.1		230		110	4.0
09		335	12.6		220		110	4.1
10		390	13.1		215		110	4.2
11		420	13.4		240			2.17
12		435	13.8		230		110	4.2
13		450	14.0		240		110	4.1
14		445	14.3		240		110	3.9
15		435	14.7		245		115	3.6
16		410	15.0		260		115	2.8
17		350	15.2		295			3.0
18		340	16.0					2.22
19		290	16.2					2.14
20		235	16.1					2.32
21		220	15.0					2.48
22		215	15.0					2.52
23		220	14.0					2.64

Time: 0.0°W.

Sweep: 1.0 Mc to 20.0 Mc in 7 seconds.

Table 12

Thule, Greenland (76.6°N, 68.7°W)							August 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			5.8		260		115	(1.85)
01			5.6		250		115	2.00
02			5.2		250		109	(2.05)
03			5.2		245		111	(2.20)
04			5.3		240		109	2.30
05	(450)		5.1		235	3.7	107	(2.55)
06	(490)		5.5		235	(4.0)	106	2.70
07			5.6		230	(4.2)	104	2.85
08			5.7		230	(4.5)	102	2.95
09			4.6		220	4.4	101	3.05
10			4.6		215	4.5	101	3.10
11			4.9		220	4.5	101	3.15
12			4.7		220	4.5	101	3.20
13			4.6		215	4.5	101	3.20
14			4.25		220	4.5	101	3.10
15			4.55					

Table 13

Resolute Bay, Canada (74.7°N, 94.9°W)							August 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2	
00		5.8	260		120	1.8	---		
01	---	5.5	260	---	120	1.8	---		
02	---	5.5	260	---	120	1.8	---		
03	---	5.3	260	---	120	2.0	(2.85)		
04	---	5.4	250	---	120	2.1	2.9		
05	(360)	5.8	240	3.5	110	2.4	(2.85)		
06	360	5.6	240	3.9	105	2.6	2.9		
07	390	5.8	230	4.1	105	2.9	3.3	2.8	
08	400	5.8	220	4.4	105	3.0	(2.85)		
09	400	6.0	220	4.5	100	3.0	(2.8)		
10	410	5.8	220	4.5	100	3.1	<3.9	(2.7)	
11	460	5.3	220	4.6	100	3.2	(2.3)		
12	480	5.3	220	4.5	100	3.3	G		
13	460	5.7	220	4.4	100	3.2	(2.4)		
14	500	5.7	220	4.5	100	3.3	G		
15	440	5.6	220	4.5	100	3.0	(2.7)		
16	420	5.5	220	4.4	100	3.0	(2.4)		
17	420	5.5	230	4.3	100	2.9	(2.4)		
18	430	5.6	230	4.1	105	2.8	(2.6)		
19	380	5.8	240	4.0	110	2.6	(2.7)		
20	350	5.8	250	3.9	120	2.3	(2.7)		
21	---	6.0	260	---	120	2.1	(2.7)		
22	---	5.6	260	---	130	2.0	---		
23	---	5.8	260	---	125	1.8	---		

Time: 90.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 15 seconds.

Table 15

Godhavn, Greenland (69.2°N, 53.5°W)							August 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2	
00	(4.9)		---	---	---	---	(2.60)		
01	(5.0)		---	---	---	---	(2.70)		
02	(4.8)		---	---	---	---	(2.75)		
03	(4.7)		---	---	---	---	(2.90)		
04	(5.0)		---	113	---	---	(2.75)		
05	(5.1)		---	117	(2.20)	---	(2.95)		
06	(5.0)	---	111	(2.30)	---	---	(2.95)		
07	(5.6)	3.9	111	(2.70)	---	---	2.90		
08	(6.0)	4.2	109	(2.95)	---	---	(2.95)		
09	(6.2)	(4.4)	107	(3.15)	---	---	(2.85)		
10	(6.7)	4.7	103	(3.30)	---	---	(2.85)		
11	7.1	(4.7)	101	(3.40)	---	---	2.80		
12	(6.6)	(4.8)	101	(3.40)	---	---	2.80		
13	(6.2)	(4.8)	101	3.35	---	---	(2.60)		
14	(6.2)	4.6	101	(3.30)	---	---	(2.60)		
15	(5.8)	4.7	103	3.20	---	---	(2.45)		
16	(5.8)	4.6	107	3.05	---	---	2.60		
17	(5.7)	(4.4)	109	(2.95)	4.4	---	2.65		
18	(5.8)	(4.2)	110	(2.70)	2.9	---	2.65		
19	(5.9)	---	114	(2.40)	3.7	---	2.70		
20	(5.0)	---	117	(2.20)	---	---	(2.70)		
21	(5.6)	---	121	(2.00)	---	---	(2.70)		
22	5.4	---	<133	(1.65)	---	---	2.70		
23	(5.2)	---	121	(1.40)	---	---	2.75		

Time: 45.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 16.2 seconds.

Table 17

Churchill, Canada (58.8°N, 94.2°W)							August 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2	
00	5.2	300	---	---	---	6.0	---		
01	5.2	300	150	1.2	5.0	---			
02	5.0	300	---	(1.7)	5.0	---			
03	4.5	330	140	(1.8)	5.0	---			
04	4.3	310	130	(2.0)	4.1	---			
05	5.0	300	125	2.4	4.2	---			
06	440	5.2	290	4.0	110	3.0	3.1	(2.8)	
07	480	5.8	270	4.2	105	3.2	<4.5	(2.75)	
08	420	6.0	250	4.8	105	3.2	2.6		
09	440	6.3	230	5.0	100	3.3	2.6		
10	450	6.3	220	5.0	100	3.5	2.5		
11	470	6.5	220	5.1	100	3.6	4.2	2.5	
12	450	6.8	220	5.1	100	3.6	4.0	2.5	
13	460	6.9	220	5.2	100	3.6	4.4	2.4	
14	450	6.9	220	5.2	100	3.6	4.2	2.5	
15	420	7.0	220	5.0	105	3.5	2.5		
16	400	7.0	230	4.9	105	3.3	2.5		
17	400	6.8	230	4.5	110	3.0	2.6		
18	350	6.3	250	(4.3)	110	3.0	2.6		
19	(330)	6.4	290	---	120	2.8	2.6		
20	6.1	300	---	125	2.4	<3.8	(2.7)		
21	5.6	300	---	130	2.2	5.5	---		
22	5.2	300	---	120	(2.0)	7.6	---		
23	5.0	300	---	---	---	8.0	---		

Time: 90.0°W.

Sweep: 1.0 Mc to 17.0 Mc in 16 seconds.

Table 14

Point Barrow, Alaska (71.3°N, 156.8°W)							August 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2	
00			(4.8)	280	---	---	---	3.2	2.95
01			4.9	280	---	---	---	3.4	2.90
02			(4.8)	280	---	---	---	2.3	2.90
03			5.1	285	---	---	---	2.6	2.85
04			5.2	280	---	121	2.30	2.85	
05	(400)		5.1	270	3.6	123	2.30	2.85	
06	410		5.6	250	4.0	113	2.75	2.75	
07	420		5.5	240	4.0	108	2.85	2.60	
08	485		6.1	240	4.4	107	3.25	2.65	
09	430		6.0	230	4.5	103	3.05	2.70	
10	415		6.1	220	4.6	101	(3.00)	2.65	
11	395		6.2	220	4.7	101	3.30	2.80	
12	400		6.0	210	4.8	101	3.20	2.70	
13	415		6.2	220	4.7	101	3.10	2.70	
14	415		6.2	220	4.6	101	3.10	2.70	
15	425		6.4	220	4.8	103	2.95	2.70	
16	(420)		6.6	220	4.6	107	2.90	2.80	
17	(420)		6.8	225	4.3	108	2.85	2.90	
18	(470)		6.4	230	4.0	111	2.60	2.90	
19			6.4	240	---	117	2.40	2.95	
20			5.7	250	---	121	2.40	2.95	
21			5.4	285	---	122	2.50	3.00	
22			5.0	275	---	134	2.40	3.00	
23			4.5	300	---	131	2.35	2.4	

Time: 150.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 16

Nurmijarvi, Finland (60.5°N, 24.6°E)							August 1957		
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2	
00			(6.0)	---	---	---	---	<2.5	---
01			---	---	---	---	---	<2.0	---
02			5.2	---	---	---	---	<2.1	2.50
03			(5.0)	---	---	---	---	<2.1	(2.60)
04			(5.0)	---	---	---	---	<2.2	(2.65)
05			5.5	---	---	---	---	<2.4	2.70
06			5.9	---	---	---	---	2.80	
07			6.8	---	---	---	---	2.60	2.80
08			7.0	---	---	---	---	3.00	2.80
09			7.4	5.0	---	---	3.10	4.1	2.70
10			7.6	5.2	---	---	3.30	3.8	2.70
11			7.6	5.0	---	---	---	2.70	
12			7.6	5.3	---	---	---	2.70	
13			7.6	5.4	---	---	---	2.75	
14			7.7	5.2	---	---	---	2.75	
15			7.3	5.0	---	---	---	2.80	
16			7.5	---	---	---	---	2.80	
17			7.3	---	---	---	---	2.80	
18			8.4	280	---	---	---	4.0	
19			8.4	280	---	---	---	4.1	
20			7.9	280	---	---	---	3.8	
21			(7.6)	300	---	---	---	3.7	
22			7.0	300	---	---	---	3.8	
23			6.8	340	---	---	---	3.5	

Time: 30.0°E.

Sweep: 1.0 Mc to 11.5 Mc in 2 minutes.

Table 19

Ft. Monmouth, New Jersey (40.3°N, 74.1°W)							August 1957
Time	h°F2	f°F2	h°F	f°F1	h°E	f°E	f°Es (M3000)F2
00		6.0	265			(4.0)	2.70
01		5.7	<265			4.0	2.70
02		5.5	<265			(2.7)	2.70
03		5.0	<265			(3.3)	2.70
04		4.6	<265			4.6	2.80
05		4.6	270		---	---	(1.8) 2.95
06		5.9	240		109 (2.40)		3.10
07	---	6.8	225	---	105 3.00	3.2	3.00
08	330	7.0	215	4.8	103 (3.35)	3.6	3.00
09	370	7.7	210	5.2	103 (3.60)	4.0	2.90
10	415	7.4	200	5.3	101 3.85	4.2	2.90
11	390	7.5	200	5.6	103 3.95	4.0	2.75
12	410	7.5	200	5.6	103 4.00	4.2	2.75
13	380	7.6	200	5.5	103 3.95		2.75
14	380	7.7	210	5.5	103 3.90		2.75
15	380	7.6	210	5.3	103 3.70		2.75
16	370	7.6	220	5.1	103 3.40	3.4	2.80
17	---	7.8	230	---	105 3.00	3.2	2.80
18		7.8	<250		108 (2.35)	2.7	2.85
19		7.8	255		---	3.0	2.85
20		7.6	<245			4.3	2.75
21		7.3	260			3.4	2.75
22		6.8	<270			4.0	2.70
23		6.5	<275			(3.5)	2.70

Time: 75.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 21

Grand Bahama I. (26.6°N, 78.2°W).							August 1957	
Time	h°F2	foF2	h°F	foF1	h°E	foE	foEs	(M3000)F2
00	7.2	290				3.2	2.70	
01	6.9	280				3.8	2.80	
02	6.5	265				(2.6)	2.75	
03	6.2	<275				(3.1)	2.75	
04	5.9	275				(2.8)	2.70	
05	5.8	265				(2.3)	2.80	
06	6.3	250			121	1.90	2.0	3.00
07	7.6	235			109	2.80	3.0	3.00
00	(335)	8.3	215	---	105	(3.30)	3.8	2.95
09	360	8.8	210	5.6	105	3.70	4.2	2.85
10	360	9.5	200	5.8	107	3.95	4.4	2.65
11	350	10.0	200	5.8	109	4.10	4.5	2.70
12	365	10.2	210	5.9	109	4.15	4.5	2.65
13	370	10.0	220	5.9	105	4.10	4.5	2.60
14	365	9.9	<230	5.8	109	4.10	4.4	2.65
15	360	9.8	220	5.7	109	3.90	4.1	2.70
16	350	9.4	230	5.4	109	3.60	4.0	2.70
17	<330	9.0	235	---	109	3.20	3.8	2.80
18	---	8.9	250		111	----	2.8	2.80
19		8.3	250				3.1	2.80
20		8.0	260				2.8	2.70
21		7.5	270				4.0	2.70
22		7.3	290				3.3	2.70
23		7.3	300				2.9	2.65

Time: 75.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 23

Bogota, Colombia (4.5°N, 74.2°W)							August 1957
Time	h°F2	foF2	h°F	foF1	h°E	foE	foEs (M3000)F2
00		9.0	250				3.00
01		8.3	250				2.90
02		>7.9	250				3.05
03		7.0	240				3.00
04		5.9	230			(2.7)	3.10
05		4.9	250			(2.5)	2.85
06		5.7	270		---	---	2.5
07	---	7.9	240		112	2.80	3.0
08	---	8.8	230		109	3.50	2.90
09	---	10.0	225	---	109	3.85	2.55
10	---	11.1	220	---	108	(4.10)	4.2
11	415	12.0	220	6.0	109	(4.15)	4.5
12	405	12.4	215	6.0	109	4.25	4.4
13	415	13.0	220	6.0	109	(4.20)	4.7
14	410	13.7	215	5.8	109	(4.05)	4.8
15	380	13.6	220	---	109	(3.80)	4.5
16	380	13.5	230	---	109	3.40	3.9
17	---	13.3	250		114	2.75	3.7
18		13.4	270				2.60
19		13.2	290				3.1
20		13.5	280				2.65
21		13.2	270				2.75
22		13.2	250				2.85
23		11.9	<260				2.90

Time: 75.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 20

San Francisco, California (37.4°N, 122.2°W)							August 1957
Time	h°F2	f0f2	h°F	f0f1	h°E	foE	(M3000)F2
00		5.4	(310)			3.4	2.50
01		5.4	310			3.0	2.55
02		5.4	300			2.6	2.55
03		5.3	290			3.0	2.60
04		5.0	<300			2.8	2.60
05		4.8	290		---	---	(2.3)
06	---	5.9	260	---	119	2.10	2.5
07	(425)	6.9	230	4.4	109	(2.90)	3.2
08	430	8.0	<225	5.0	109	(3.30)	3.5
09	390	8.7	210	5.2	109	(3.50)	4.0
10	390	9.2	210	5.3	109	(3.70)	4.3
11	385	9.2	205	5.6	109	(4.00)	4.1
12	380	9.4	215	5.8	109	4.00	
13	370	9.7	220	5.7	109	4.00	
14	365	9.6	220	5.7	109	4.00	
15	360	9.0	230	5.6	109	(3.70)	
16	350	8.8	240	5.3	109	3.50	
17	---	8.3	240	---	109	3.10	3.5
18	---	8.4	250		119	2.50	3.0
19		8.0	260				3.2
20		7.5	250				3.7
21		6.8	260				3.7
22		5.8	260				3.5
23		5.6	<300				3.3

Time: 120.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 22

Panama	Canal Zone	(9.4°N, 79.9°W)						August 1957
Time	h'F2	foF2	h'F	foFl	h'E	foE	foEs	(M3000)F2
00		9.3	260					2.85
01		8.6	250					2.90
02		8.0	245					2.90
03		7.4	240					2.95
04		6.8	230					2.95
05		5.5	230				2.0	2.90
06		5.4	270		---	---		2.85
07	---	7.0	240		111	2.50		3.10
08	---	8.4	225		107	3.25		2.90
09	---	9.4	215	---	107	3.70		2.65
10	---	10.5	215	---	109	4.00		2.50
11	400	11.2	220	6.0	109	4.15	4.6	2.50
12	385	12.0	215	6.0	109	4.25	4.6	2.55
13	400	12.5	215	6.0	109	4.25	4.2	2.55
14	390	12.7	215	6.0	109	4.15	4.5	2.60
15	375	13.0	220	5.7	109	(3.95)	4.5	2.65
16	350	13.0	230	---	109	(3.60)	4.4	2.65
17	<320	12.4	235	---	109	3.10	3.9	2.70
18	(265)	11.6	250		114	2.30	2.6	2.75
19		10.8	260				3.2	2.75
20		10.0	265					2.70
21		10.0	270					2.70
22		9.7	270					2.75
23		9.6	270					2.75

Time: 75.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds

Table 2

Canberra, Australia (35.3°S, 149.0°E)							August 1957	
Time	h°F2	foF2	h°F	foF1	h°E	foE	foEs (M3000)F2	
00		5.5	270				2.75	
01		5.5	270				2.80	
02		5.4	260				2.80	
03		5.2	260				2.85	
04		4.9	250				2.90	
05		4.7	250				2.90	
06		4.3	<250				3.00	
07		6.9	240		130	2.00	3.25	
08	(245)	9.2	230	---	110	2.75	(3.30)	
09	250	10.4	230	(5.0)	110	3.20	3.15	
10	240	11.0	225	(4.9)	105	3.50	3.15	
11	250	>11.0	220	(4.8)	105	3.65	3.15	
12	260	10.9	220	(5.0)	105	3.75	3.05	
13	260	10.9	210	(4.8)	105	3.70	3.9	3.00
14	250	10.8	220	(4.7)	110	3.50	3.8	2.95
15	---	10.6	220	---	110	3.30		2.95
16	---	10.2	240	---	110	2.90		2.95
17	---	9.8	235	---	125	2.25		3.00
18		8.8	230					3.10
19		>8.0	230					3.00
20		7.4	240					2.90
21		6.8	240					2.90
22		6.0	<250					2.85
23		(5.7)	<260					2.80

Time: 150.0°E.  
Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 25

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs
00	380	5.9	245	4.1	---	---	2.70
01	400	5.9	255	4.0	109	---	2.60
02	360	6.1	<240	3.8	---	---	2.65
03	355	6.0	(240)	4.0	111	---	2.65
04	400	6.0	<250	4.2	109	---	2.60
05	420	5.4	<240	4.2	108	---	2.75
06	400	6.0	<240	4.2	---	---	2.65
07	365	5.8	230	4.3	105	---	2.70
08	405	5.8	<230	4.4	---	---	2.55
09	420	5.6	230	4.5	---	---	2.70
10	480	5.7	230	4.4	---	---	2.55
11	445	6.0	<220	4.5	---	---	2.50
12	490	5.8	215	4.5	---	---	2.50
13	460	5.6	<215	4.6	---	---	2.50
14	450	5.8	<215	4.6	---	---	2.50
15	455	6.0	215	4.5	105	---	2.50
16	470	5.5	<220	4.4	---	---	2.45
17	510	5.5	<240	4.4	---	---	2.45
18	520	5.6	230	4.4	---	---	2.45
19	480	6.0	<230	4.3	---	---	2.50
20	415	5.7	<235	4.2	---	---	2.70
21	475	5.6	<245	4.2	109	---	2.50
22	440	5.8	235	4.2	---	---	2.55
23	420	5.9	<240	4.0	---	---	2.70

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

\*preliminary estimated average position.

Table 27

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs
00	(5.5)	---	121	(1.80)	---	(2.70)	
01	(5.3)	---	137	(1.80)	---	(2.75)	
02	(5.5)	---	117	1.90	---	(2.70)	
03	(5.1)	---	115	(2.05)	---		
04	(4.8)	---	113	(2.20)	---	(2.55)	
05	(5.2)	(3.6)	111	(2.50)	---	2.75	
06	(5.0)	(4.1)	109	(2.80)	---	(2.60)	
07	(5.6)	(4.3)	107	(3.00)	---		
08	(5.4)	(4.6)	104	3.20	6		
09	(6.0)	(4.8)	101	3.35	---	(2.60)	
10	(6.4)	4.9	101	3.40	---	2.60	
11	(6.4)	(4.8)	101	3.50	---	(2.60)	
12	(6.5)	5.0	101	3.50	---	2.60	
13	(6.2)	5.0	101	(3.50)	---	(2.45)	
14	(6.3)	(5.0)	101	(3.50)	---	(2.50)	
15	(6.2)	4.9	101	3.40	---	2.50	
16	(5.8)	(4.9)	103	3.30	3.6	2.45	
17	(5.8)	4.7	103	3.20	3.5	2.50	
18	(5.8)	4.5	105	3.05	3.6	2.50	
19	(5.7)	(4.4)	107	2.85	---	2.65	
20	(5.9)	4.0	111	2.55	---	2.70	
21	(5.7)	---	113	(2.40)	---	2.70	
22	(5.7)	---	119	(2.15)	---	2.65	
23	(5.7)	---	131	(1.95)	---	2.70	

Time: 45.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 16.2 seconds.

Table 29

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs
00	7.4	315	---	---	2.2	2.45	
01	7.0	305	---	---	2.9	2.40	
02	6.6	310	---	---	3.0	2.45	
03	6.4	310	170	<1.10	3.2	2.50	
04	6.2	305	---	140	<1.70	3.2	2.55
05	6.4	270	3.6	130	2.30	3.5	2.60
06	410	6.8	250	4.2	120	2.80	3.6
07	500	7.0	250	4.8	110	3.20	3.8
08	415	7.5	240	5.2	110	3.45	4.1
09	415	7.8	230	5.5	110	3.65	4.9
10	395	8.1	230	5.5	110	3.80	5.0
11	410	7.8	220	5.7	110	3.90	4.9
12	420	8.2	220	5.8	110	3.90	4.7
13	430	7.9	230	5.7	110	3.90	4.7
14	415	7.9	230	5.7	110	3.80	4.6
15	400	8.0	240	5.6	110	3.80	4.4
16	390	7.6	240	5.4	110	3.60	4.2
17	360	7.9	245	5.3	110	3.30	4.2
18	360	8.2	250	5.3	115	2.90	3.7
19	310	8.0	270	125	2.40	4.4	2.70
20	7.9	280	150	1.80	3.8	2.65	
21	8.1	290	---	<1.60	2.3	2.50	
22	7.8	300	---	---	2.6	2.45	
23	7.7	310	---	---	2.3	2.45	

Time: 0.0°.

Sweep: 0.55 Mc to 16.5 Mc in 5 minutes.

Table 26

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs
00	(400)	5.6	270	3.4	120	2.3	(2.7)
01	(370)	5.9	260	3.4	120	2.3	(2.8)
02	(360)	6.0	260	3.6	110	2.3	(2.7)
03	380	6.0	250	3.9	110	2.4	---
04	360	5.8	240	4.0	110	2.6	---
05	380	5.5	230	4.1	110	2.8	(2.8)
06	390	5.9	230	4.3	105	3.0	(2.7)
07	410	6.0	220	4.5	100	3.0	(2.7)
08	440	5.6	220	4.6	100	3.2	(2.55)
09	450	5.9	220	4.6	100	3.3	---
10	470	5.6	220	4.8	100	3.4	---
11	500	5.6	210	4.6	100	3.4	---
12	490	5.0	220	4.8	100	3.5	---
13	520	5.6	220	4.7	100	3.6	G
14	540	5.7	200	4.8	100	3.5	---
15	500	5.7	210	4.6	100	3.3	(2.4)
16	500	5.5	220	4.6	100	3.3	---
17	490	5.9	220	4.6	100	3.1	(2.3)
18	450	6.0	220	4.5	100	3.0	---
19	410	6.1	230	4.2	105	2.9	---
20	380	6.0	240	4.0	105	2.7	---
21	360	6.0	250	4.0	105	2.6	(2.6)
22	320	6.0	250	3.8	115	2.4	---
23	(360)	5.7	250	3.5	115	2.3	---

Time: 90.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 28

Time	July 1957						
	h'F2	foF2	h'F	foF1	h'E	foE	foEs
00	7.0	300	---	---	1.80	---	2.70
01	6.7	310	---	---	1.9	2.70	
02	6.4	310	---	---	2.4	2.75	
03	6.1	310	---	---	2.2	2.80	
04	6.2	290	---	---	155	1.80	2.80
05	6.1	265	---	---	120	2.35	2.90
06	6.6	230	4.3	110	2.75	3.0	2.90
07	425	6.5	240	4.8	105	3.10	3.3
08	400	7.0	240	5.2	105	3.30	3.8
09	410	7.3	235	5.2	105	3.50	3.9
10	410	7.6	225	5.4	105	3.60	4.0
11	410	7.4	220	5.5	100	3.80	4.2
12	470	7.4	220	5.7	100	3.90	2.85
13	450	7.3	220	5.6	100	3.90	2.85
14	450	7.4	220	5.5	100	3.80	2.80
15	415	7.4	225	5.5	105	3.70	2.85
16	410	7.4	225	5.3	105	3.60	2.90
17	400	7.6	245	5.2	105	3.40	2.90
18	365	7.6	255	4.8	110	3.05	3.05
19	7.2	255	---	---	110	2.60	2.8
20	7.0	270	---	---	135	2.30	3.05
21	6.9	275	---	---	160	1.80	2.90
22	7.2	290	---	---	7.2	300	2.85
23	7.2	300	---	---	7.2	300	2.70

Time: 0.0°.

Sweep: 0.67 Mc to 20.0 Mc in 5 minutes.

Table 30

Time	July 1957						
	h'F2	foF2	h'F1	foF1	h'E	foE	fEs
00	325	7.3	---	---	---	---	2.86
01	320	7.2	---	---	---	---	2.84
02	320	6.8	---	---	---	---	2.86
03	310	6.3	---	---	---	---	2.90
04	315	6.1	---	---	---	---	2.86
05	300	6.6	275	3.6	135	2.0	3.0
06	310	7.2	250	4.3	120	2.6	3.4
07	345	7.4	250	5.0	120	3.1	4.6
08	390	8.0	250	5.4	115	3.4	5.0
09	370	8.4	240	5.7	115	3.6	5.1
10	390	8.7	250	5.8	115	3.7	5.2
11	400	8.8	245	5.7	115	3.8	5.2
12	410	8.7	250	5.9	115	3.8	5.4
13	420	8.5	265	6.0	115	3.8	5.3
14	400	8.4	260	5.8	115	3.8	4.6
15	400	8.4	250	5.6	115	3.6	4.5
16	385	8.2	250	5.5	115	3.5	4.3
17	355	8.1	255	5.2	120	3.1	4

Table 31

Graz, Austria (47.1°N, 15.5°E)							July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	7.3	320						
01	>7.1	330						
02	6.8	335						
03	6.7	330						
04	6.3	300						
05	6.8	280						
06	>7.1	250	4.4					
07	(340)	>7.0	235	5.0	3.3	4.2		
08	350	7.5	240	5.1	3.7	4.2		
09	345	>7.6	230	5.4	3.8	4.6		
10	380	(8.7)		5.5	3.8	4.6		
11	365	>7.2	<260	5.8	(3.9)	4.2		
12	400	>7.2		---	---	4.2		
13	400	(8.3)		5.4	---	4.2		
14	380	(7.3)	<250	5.5	---	4.1		
15	350	8.6	220	5.3	---	4.2		
16	360	8.4	230	5.2	(3.7)	4.0		
17	340	7.9	240	5.0	---	4.1		
18	>8.0	250				3.9		
19	8.3	280				3.8		
20	(8.2)	280				3.9		
21	>8.0	280				4.0		
22	(7.5)	310						
23	7.2	300						

Time: 15.0°E.

Sweep: 2.5 Mc to 11.5 Mc in 2 minutes.

Table 33

Leopoldville, Belgian Congo (4.4°S, 15.2°E)							July 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	215	10.6				3.0	2.84	
01	220	8.9				3.0	2.67	
02	230	7.2				3.0	2.66	
03	235	6.0				2.9	2.68	
04	245	5.4				3.0	2.68	
05	270	6.1				2.6	2.66	
06	255	10.4	245	---	115	2.6	2.82	
07	265	12.1	235	---	110	3.3	2.85	
08	275	12.3	230	---	105	3.8	2.73	
09	295	12.4	220	---	105	4.0	2.60	
10	335	12.3	215	---	105	4.0	2.48	
11	355	12.8	210	---	105	4.1	2.36	
12	385	13.0	210	---	105	4.0	2.27	
13	415	13.8	240	---	105	4.0	2.19	
14	395	14.0	245	---	110	3.7	2.20	
15	385	14.2	240	---	110	3.3	2.21	
16	340	14.0	250	---	115	2.6	2.27	
17	280	15.0	275	---	---	3.0	2.38	
18	260	16.0				2.8	2.50	
19	265	16.0				2.3	2.54	
20	220	15.7				3.0	2.55	
21	220	16.0				2.4	2.64	
22	220	15.0				3.0	2.75	
23	210	14.0				2.6	2.72	

Time: 0.0°.

Sweep: 1.0 Mc to 20.0 Mc in 7 seconds.

Table 35

Rarotonga I. (21.2°S, 159.8°W)							July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	6.8	<240					3.30	
01	6.1	250					3.20	
02	5.4	250					3.30	
03	5.4	<250					3.35	
04	4.2	240					3.35	
05	3.7	250					3.20	
06	3.8	(270)					3.10	
07	5.2	290	---	---	2.2		3.25	
08	---	9.8	250	100	2.3	3.4	3.55	
09	---	12.5	250	100	3.1		3.40	
10	260	13.8	240	100	3.5		3.50	
11	260	13.0	230	100	3.8		3.40	
12	(260)	12.1	230	100	3.9		3.30	
13	300	11.8	210	100	3.9		3.20	
14	(340)	12.1	210	100	3.8		3.15	
15	340	12.4	230	100	3.6		3.10	
16	(330)	12.5	250	100	3.3	3.8	3.10	
17	---	12.3	250	100	2.8	4.3	3.15	
18	13.0	250	100	1.9	4.0		3.25	
19	12.8	240			3.2		3.35	
20	11.2	240			2.8		3.25	
21	10.5	250			2.6		3.20	
22	9.0	240			1.4		3.20	
23	8.0	240					3.30	

Time: 165.0°W.

Sweep: 1.5 Mc to 20.0 Mc in 5 minutes, manual operation.

Table 32

Baguio, P.I. (16.4°N, 120.6°E)							July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			>11.0		335			
01			11.0		300			
02			9.6		270			
03			8.6		270			
04			7.6		270			
05			6.3		265			
06			8.0		300			
07			8.8		285			
08			9.4		270			
09			10.2		250			
10			10.8		250			
11			11.5		245			
12			12.4		240			
13			12.6		245			
14			12.8		250			
15			13.2		255			
16			12.9		270			
17			12.6		285			
18			12.6		315			
19			11.7		380			
20			11.0		460			
21			>10.5		440			
22			10.5		420			
23			10.7		380			

Time: 120.0°E.

Sweep: 1.0 Mc to 25.0 Mc in 13.5 seconds.

Table 34

Elisabethville, Belgian Congo (11.6°S, 27.5°E)							July 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	240	4.9						
01	250	4.2						
02	255	3.7						
03	265	3.0						
04	255	3.6	---	---	---			
05	245	8.0	---	---	125	2.3	3.0	2.88
06	250	10.4	240	---	110	3.0	3.4	2.82
07	255	11.6	230	---	105	3.5		2.81
08	270	11.4	230	---	105	3.8	3.8	2.68
09	280	11.5	230	---	105	3.9		2.54
10	300	11.4	235	---	105	4.0	4.4	2.45
11	340	11.1	240	---	105	4.0	4.1	2.36
12	345	11.3	240	---	105	3.8	4.7	2.33
13	355	11.5	240	---	105	3.6	4.6	2.30
14	330	11.5	240	---	110	3.2	4.8	2.30
15	290	11.4	250	---	115	2.6		2.40
16	255	12.0						2.54
17	235	11.3						2.67
18	230	10.2						2.8
19	240	11.0						3.0
20	230	10.8						2.9
21	225	9.5						2.7
22	225	7.6						2.0
23	230	6.0						2.5

Time: 0.0°.

Sweep: 1.0 Mc to 20.0 Mc in 7 seconds.

Table 36

Sao Paulo, Brazil (23.5°S, 46.5°W)							July 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00	8.7	230						
01	8.2	240						
02	7.3	235						
03	7.0	230						
04	4.9	240						
05	4.4	260						
06	4.0	260						
07	7.2	270						
08	9.9	250						
09	11.4	240						
10	12.5	230						
11	12.9	220						
12	13.0	220						
13	12.9	215						
14	13.6	220						
15	14.0	240						
16	14.2	250						
17	14.5	260						
18	>14.0	240						
19	11.8	230						
20	11.4	250						
21	11.3	260						
22	11.2	240						
2								

**Table 37**  
Watheroo, W. Australia (30°35' S, 115°9'E)

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	July 1957
00			>4.3		<245			3.20	
01			>4.0		<250			<3.10	
02			(3.9)		<250			(3.05)	
03			>3.8		250			<3.00	
04					4.0			<3.20	
05					(4.0)			3.20	
06					3.8			<3.30	
07					>5.0			<1.1	
08					240			(3.40)	
09					8.0			3.00	
10					220			3.1	
11					11.5			3.4	
12					220			3.5	
13					11.4			3.55	
14					(210)			3.60	
15					215			3.65	
16					280			3.30	
17					11.0			3.15	
18					(210)			3.15	
19					11.6			3.20	
20					<220			3.20	
21					11.0			3.20	
22					<225			3.20	
23					11.0			3.20	

Time: 120.0°E.  
Sweep: 1.0 Mc to 16.0 Mc in 1 minute 45 seconds.

**Table 39**

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	July 1957
00			5.0		300			<1.7	2.70
01			4.8		300			<1.8	2.60
02			4.6		300			3.2	2.60
03			4.6		290			<2.5	2.65
04			4.5		260			<1.7	2.75
05			4.2		250			<1.7	2.80
06			3.8		250			<1.7	2.80
07			3.7		260			<1.5	2.80
08			6.3		240			1.9	3.05
09			9.0		240			2.6	3.15
10			11.0		240			3.0	3.20
11			11.5		240			3.3	3.10
12			11.8		240			3.4	3.05
13			11.4		240			3.4	3.00
14			11.9		250			3.3	3.00
15			11.1		240			3.1	3.00
16			10.8		240			(2.9)	3.00
17			10.0		240			2.7	3.00
18			8.6		240			<2.3	2.90
19			7.8		250			<2.2	2.90
20			6.9		250			<2.2	2.90
21			6.2		250			<2.1	2.80
22			5.3		280			<1.8	2.70
23			4.9		280			<1.9	2.65

Time: 180.0°E.  
Sweep: 1.0 Mc to 13.0 Mc in 1 minute 55 seconds.

**Table 41**

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	June 1957
00			(5.2)			131	(2.00)	2.70	
01			(5.5)			<131	(2.00)	(2.70)	
02			(5.2)			131	(2.10)	(2.80)	
03			5.0		(3.5)	115	(2.20)	2.60	
04			(5.2)		(3.6)	111	(2.40)	(2.65)	
05			(5.2)		(3.9)	109	(2.60)	2.75	
06			(5.0)		(4.2)	107	(2.95)	----	
07			(5.4)		(4.4)	101	(3.10)	----	
08			5.0		(4.6)	101	(3.30)	G	
09			(6.2)		(4.7)	101	(3.40)	----	
10			(6.4)		(4.9)	101	3.60	(2.20)	
11			(6.3)		5.0	101	(3.60)	(2.50)	
12			(6.3)		5.0	101	(3.65)	(2.40)	
13			(6.3)		5.0	101	(3.60)	(2.35)	
14			(6.0)		4.9	101	(3.55)	G	
15			(5.8)		4.9	101	(3.45)	G	
16			(5.8)		4.9	101	3.35	3.8	(2.30)
17			(5.6)		4.7	103	(3.25)	3.5	2.40
18			5.6		(4.5)	101	3.10	2.50	
19			(5.9)		4.2	108	2.95	2.60	
20			(5.7)		(4.0)	110	(2.70)	2.65	
21			(5.6)		(3.8)	115	(2.50)	2.70	
22			(5.6)		(3.5)	119	2.30	(2.70)	
23			(5.3)		---	<137	(2.15)	2.70	

Time: 45.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 16.2 seconds.

**Table 38**

Capetown, Union of S. Africa (34.1°S, 18.3°E)

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	July 1957
00					2.6	<310		2.0	2.70
01					2.7	<320		<1.6	2.75
02					2.8	<305		<1.6	2.70
03					2.8	<300		1.7	2.75
04					2.9	<280		<1.6	2.85
05					2.6	<260		2.0	2.95
06					2.5	<300		1.8	2.80
07					2.7	<270		<1.6	2.80
08					6.4	240		2.0	3.10
09					8.9	230		2.7	3.25
10					(240)	10.5		3.1	3.20
11					250	11.1		3.4	3.10
12					255	11.5		3.6	2.95
13					260	11.7		3.6	2.85
14					255	11.7		3.6	2.85
15					250	11.8		3.4	2.80
16					255	11.5		3.1	2.85
17					11.2	240		2.6	2.95
18					10.4	220		1.7	3.00
19					8.1	220		2.0	3.10
20					5.8	220		2.3	3.25
21					4.0	230		2.0	3.20
22					3.0	<235		2.6	3.20
23					2.5	<285		3.0	2.80

Time: 30.0°E.  
Sweep: 1.0 Mc to 16.0 Mc in 7 seconds.

**Table 40**

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	July 1957
00					4.7	<300		3.6	2.6
01					4.4	290		3.3	2.7
02					4.4	<290		3.5	2.7
03					4.2	270		2.8	2.7
04					4.2	270		2.2	2.8
05					4.2	<260		2.5	2.8
06					3.8	<260		2.0	2.8
07					4.1	250		<1.5	2.8
08					6.6	240		135	2.4
09					8.8	230		120	3.1
10					(250)	10.2		120	2.8
11					(250)	11.2		120	3.0
12					(260)	11.6		120	3.1
13					---	11.3		120	2.8
14					---	10.8		120	2.9
15					11.0	230		120	3.0
16					10.3	230		125	2.4
17					8.8	<230		---	<1.5
18					7.6	230		2.0	2.9
19					6.5	250		<1.5	2.9
20					5.9	250		<1.5	2.8
21					5.2	250		2.4	2.7
22					4.9	<280		3.5	2.7
23					4.8	300		3.2	2.7

Time: 165.0°E.  
Sweep: 1.0 Mc to 15.0 Mc in 5 minutes, manual operation.

**Table 42**

Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	June 1957
00					8.3	310		2.3	2.50
01					8.1	305		2.3	2.55
02					7.8	300		2.3	2.55
03					7.5	310		2.3	2.50
04					7.6	300		2.3	2.50
05					---	8.0		2.9	2.55
06					385	8.0		3.5	2.60
07					380	8.0		5.0	2.65
08					380	8.0		6.0	2.60
09					410	8.0		5.8	2.60
10					410	8.0		5.5	2.55
11					440	8.1		5.6	2.50
12					430	8.2		5.4	2.60
13					420	8.3		5.0	2.55
14					430	8.2		5.0	2.55
15					430	8.0		4.5	2.60
16					420	7.9		5.0	2.60
17					400	7.9		4.1	2.65
18					380	8.0		5.5	2.70
19					---	8.0		4.8	2.60
20					8.0	300		4.0	2.60
21					8.3	320		4.2	2.50
22					8.3	320		3.8	2.50
23					8.5	310</td			

Table 43

Akita, Japan (39.7°N, 140.1°E)								June 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00	8.4	310			3.9	2.55			
01	8.4	305			3.7	2.60			
02	8.1	300			3.5	2.65			
03	7.8	300			3.2	2.50			
04	7.7	305			3.1	2.50			
05	---	8.1	255		3.5	2.65			
06	330	8.7	250		4.0	2.65			
07	350	8.6	250		5.7	2.70			
08	370	8.2	260		6.4	2.60			
09	400	8.5	(240)		6.6	2.55			
10	410	9.0	(250)		6.6	2.55			
11	430	9.2	(240)		7.2	2.55			
12	450	9.4	225		7.1	2.55			
13	410	9.5	240		5.8	2.55			
14	405	9.4	250		6.4	2.55			
15	395	9.1	250		5.6	2.60			
16	380	8.8	250		6.2	2.60			
17	355	8.7	260		6.2	2.70			
18	(310)	8.4	290		5.6	2.70			
19	8.3	300			6.5	2.65			
20	8.2	330			6.9	2.55			
21	8.3	350			6.0	2.45			
22	8.4	350			5.0	2.45			
23	8.7	340			4.1	2.50			

Time: 135.0°E.

Sweep: 0.85 Mc to 22.0 Mc in 2 minutes.

Table 45

Yamagawa, Japan (31.2°N, 130.6°E)								June 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00	10.0	340			5.8	2.55			
01	10.0	300			5.0	2.65			
02	9.3	290			5.5	2.70			
03	8.9	300			4.0	2.55			
04	8.4	300			3.7	2.55			
05	8.2	300			3.6	2.60			
06	---	9.0	255		3.6	2.90			
07	---	9.4	250		4.0	2.85			
08	(285)	9.0	250		5.6	2.70			
09	385	9.4	250		7.4	2.50			
10	400	9.8	250		8.3	2.45			
11	410	10.3	230		7.1	2.50			
12	410	10.8	230		5.9	2.50			
13	405	11.2	240		5.6	2.50			
14	400	11.4	240		5.7	2.55			
15	390	11.3	245		5.6	2.55			
16	370	11.1	250		5.1	2.60			
17	355	11.0	250		5.8	2.65			
18	320	10.8	250		5.8	2.65			
19	10.0	<295			4.8	2.65			
20	9.5	300			4.2	2.55			
21	9.2	350			4.9	2.45			
22	9.4	350			5.6	2.45			
23	9.7	350			5.8	2.50			

Time: 135.0°E.

Sweep: 1.0 Mc to 20.0 Mc in 1 minute.

Table 47

Elisabethville, Belgian Congo (11.6°S, 27.5°E)								June 1957	
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2	
00	235	6.1			1.6	2.42			
01	235	5.0			1.6	2.42			
02	245	3.7			2.2	2.48			
03	260	3.0			2.2	2.54			
04	260	4.1			1.6	2.28			
05	245	9.0	---	---	120	2.2	3.2	2.86	
06	245	11.6	240	---	110	3.0	3.6	2.81	
07	250	12.1	230	---	100	3.6	4.1	2.70	
08	270	12.1	230	---	105	3.9	4.2	2.59	
09	290	12.0	235	---	100	4.0	4.7	2.51	
10	325	11.7	235	---	100	4.0	5.0	2.39	
11	350	11.9	230	---	105	4.0	4.8	2.32	
12	365	11.7	245	---	105	3.9	4.8	2.24	
13	350	11.6	240	---	105	3.7	4.6	2.24	
14	330	11.8	240	---	110	3.4	4.7	2.26	
15	280	11.8	255	---	115	2.6	4.1	2.35	
16	250	12.0			3.9	2.52			
17	230	11.6			3.8	2.62			
18	230	10.0			3.8	2.62			
19	230	10.1			3.0	2.50			
20	230	9.9			2.7	2.59			
21	225	9.4			2.5	2.58			
22	230	8.4			1.9	2.44			
23	230	7.0			1.8	2.39			

Time: 0.0°.

Sweep: 1.0 Mc to 20.0 Mc in 7 seconds.

Table 48

Rarotonga I. (21.2°S, 159.8°W)								June 1957	
Time	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2	
00			7.2	270					2.80
01			7.0	260					2.85
02			5.6	260					2.95
03			5.6	280					2.90
04			4.8	250					3.00
05			3.6	290					2.80
06			4.2	300					2.75
07			6.9	290					2.80
08	(10, 9)	250			200	1.6			
09	(14, 0)	250			100	2.4			(3.15)
10	---	14.0	240		100	3.2	3.6		(3.25)
11	---	13.5	240		100	3.8	3.8		2.95
12	---	12.5	240		100	3.9			2.90
13	---	12.8	240		100	3.9	4.2		2.85
14	---	12.8	240	---	100	3.8	4.2		2.75
15	---	12.9	250		100	3.8	4.0		2.80
16	---	12.2	250		100	3.4	3.9		2.80
17	---	12.8	250		100	2.9	3.6		2.80
18	---	13.2	250		100	2.0	3.0		2.95
19	---	13.1	250						3.1
20	---	9.8	240						3.05
21	---	9.2	250						(2.90)
22	---	8.8	250						2.85
23	---	8.0	250						2.85

Time: 165.0°W.

Sweep: 1.5 Mc to 20.0 Mc in 5 minutes, manual operation.

Table 49

Time	Cape Hallett (72.3°S, 170.3°E)								June 1957	
	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2		
00		(4.6)	275	---	---	<1.4		(2.45)		
01		(4.7)	295	---	---	<1.7		---		
02		(4.1)	285	---	(1.5)			(2.40)		
03		(4.7)	270	---	---	<1.5		---		
04		(5.0)	(240)	---	---	<2.2		---		
05		(3.9)	245	---	---	<2.0		---		
06		(4.6)	285	---	---	<1.5		---		
07		(3.9)	265	---	---	<1.8		---		
08		(5.3)	260	---	---	<1.8		---		
09		---	250	---	---	<1.5		---		
10		(5.6)	230	---	---	<2.9		---		
11		(7.8)	240	---	---	<1.5		---		
12		(7.0)	230	---	---	<2.1		---		
13		(7.0)	250	---	---	<3.0		(2.70)		
14		(7.0)	245	---	---	4.7		(2.70)		
15		(7.7)	245	---	---	5.4		---		
16		(7.0)	250	---	---	<2.3		(2.60)		
17		(7.5)	245	---	---	<2.1		(2.65)		
18		(8.0)	240	---	---	<1.4		2.65		
19		(7.4)	240	---	---	<1.4		---		
20		(7.0)	250	---	---	<1.4		(2.65)		
21		(6.4)	260	---	---	<1.2		---		
22		(6.2)	260	---	---	<1.3		---		
23		(4.2)	260	---	---	<1.2		(2.30)		

Time: 165.0°E.

Table 51

Time	Providenie Bay, U.5.5.R. (64.4°N, 173.4°W)								April 1957	
	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2		
00	350	5.8						2.4		
01	380	5.9						2.3		
02	380	6.0						2.2		
03	370	5.9						2.3		
04	370	6.2						2.3		
05	370	6.2	260	3.2	120	2.4		2.3		
06	340	6.0	260	4.0	130	2.6		2.4		
07	380	6.5	250	4.5	120	3.0		2.3		
08	490	6.3	250	4.8	120	3.2		2.4		
09	420	6.6	240	5.0	120	3.4		2.5		
10	450	7.0	240	5.4	120	3.5		2.4		
11	370	7.3	240	5.6	120	3.6		2.5		
12	380	7.2	240	5.6	120	3.6		2.5		
13	370	7.3	250	5.2	120	3.6		2.5		
14	270	7.9	240	5.3	120	3.5		2.6		
15	250	8.0	250	5.2	120	3.4		2.6		
16	250	8.3			120	3.0		2.7		
17	270	8.4			120	2.6		2.6		
18	270	8.2			130	2.3		2.7		
19	280	7.8						2.6		
20	280	7.2						2.5		
21	290	6.4						2.5		
22	300	6.2						2.4		
23	350	6.0						2.4		

Time: 165.0°W.

Table 53

Time	Tomsk, U.5.5.R. (56.5°N, 84.9°E)								April 1957	
	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2		
00	300	6.7						2.4		
01	320	6.4						2.4		
02	320	5.8						2.4		
03	330	5.8						2.4		
04	320	5.4						2.4		
05	320	5.6			120	1.5		2.5		
06	290	6.3			130	2.0		2.6		
07	260	7.2	280	---	120	2.6		2.6		
08	290	8.2	260	4.7	120	2.9		2.6		
09	260	9.1	230	4.9	120	3.3		2.6		
10	260	9.7	220	5.1	120	3.5		2.7		
11	260	10.9	220	5.4	120	3.6		2.6		
12	270	11.5	220	5.7	120	3.7		2.6		
13	260	11.6	220	5.8	120	3.7		2.7		
14	290	11.7	220	5.6	110	3.6		2.6		
15	260	11.2	220	5.4	120	3.5		2.7		
16	240	11.0	220	5.0	120	3.3		2.7		
17	260	10.6			120	3.0		2.6		
18	260	10.4			120	2.6		2.7		
19	260	10.0			130	2.0		2.7		
20	260	9.7				1.5		2.6		
21	280	9.0						2.6		
22	290	8.3						2.5		
23	290	7.2						2.5		

Time: 90.0°E.

Sweep: 1.1 Mc to 16.0 Mc in 10 minutes, manual operation.

Table 49

Table 50

Time	Scott Base (77.8°S, 166.8°E)								June 1957	
	h'F2	foF2	h'F	foF1	h'E	foE	foEs	(M3000)F2		
00			(4.9)	290						(3.10)
01			(4.6)	300						---
02			(4.3)	300						(3.20)
03			(5.2)	290						---
04			(4.0)	260						---
05			(3.7)	250						(3.15)
06			(3.9)	250						(3.20)
07			(3.6)	240						---
08			(3.8)	250						(3.20)
09			(4.2)	240					1.5	(3.20)
10			(4.0)	250					2.5	---
11			(5.0)	250					3.6	(3.25)
12			(5.0)	260					2.8	(3.05)
13			6.4	250					4.0	(3.10)
14			6.4	250					2.6	(3.30)
15			7.3	250					2.1	(3.10)
16			8.1	250						(3.20)
17			8.8	250						3.10
18			8.7	250						(3.20)
19			7.9	250						(3.10)
20			(4.8)	280						(2.80)
21			5.4	280						---
22			(5.8)	270						(3.10)
23			4.6	300						(2.85)

Time: 165.0°E.

Table 51

Time	Sverdlovsk, U.5.5.R. (56.7°N, 61.1°E)								April 1957	
	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2		
00	340	6.4								2.3
01	350	5.7								2.3
02	360	5.3								2.3
03	360	5.2								2.4
04	350	5.0								2.4
05	300	5.6							150	1.9
06	280	6.4							140	2.4
07	270	7.4	270						120	2.8
08	300	7.9	250	5.1	120	3.1				2.6
09	310	8.5	250	5.4	120	3.4				2.6
10	320	9.5	240	5.4	120	3.6				2.6
11	320	10.0	240	5.5	120	3.6				2.5
12	320	10.6	240	5.6	120	3.7				2.5
13	300	10.8	240	5.5	120	3.6				2.5
14	300	10.8	250	5.5	120	3.6				2.5
15	260	10.6	230	6.2	110	3.6				2.5
16	260	10.2	240	5.7	110	3.3				2.6
17	260	9.8	240	5.1	110	3.1				2.6
18	260	9.4	---	---	110	2.0				2.7
19	260	8.8							120	1.3
20	260	8.2								2.7
21	260	7.4								2.53
22	280	6.9								2.46
23	320	6.4								2.40

Time: 60.0°E.

Sweep: 1.5 Mc to 18.0 Mc in 10 minutes, manual operation.

Table 52

Time	Moscow, U.5.5.R. (55.5°N, 37.3
------	--------------------------------

Table 55

Simferopol, U.S.S.R. (44.4°N, 34.0°E)								April 1957
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00			8.1					
01			8.1					
02			7.2					
03			7.0					
04			6.3					
05			6.7					
06			7.0					
07			8.6					
08			9.5					
09			10.4					
10			11.9					
11			12.1					
12			12.7					
13			12.5					
14			12.6					
15			12.3					
16			11.8					
17			11.5					
18			11.3					
19			11.1					
20			10.0					
21			8.8					
22			8.6					
23			8.5					

Time: 30.0°E.

Sweep: 0.5 Mc to 16.0 Mc in 15 seconds.

Table 57\*

Singapore, British Malaya (1.3°N, 103.8°E)								February 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			10.4		245			2.70
01			9.7		255			2.65
02			8.8		260		0.9	2.70
03			9.0		265			2.75
04			8.2		255			2.90
05			7.0		240			3.10
06			5.8		250			2.85
07			8.9		255	125	2.5	2.90
08			10.3		235	120	3.3	3.3
09			11.0		225	115	3.7	4.0
10			11.4		215	115	4.0	2.05
11			11.8		210	115	4.2	2.05
12			11.9		215	115	4.3	2.05
13			12.5		210	115	4.2	2.05
14			12.9		210	115	4.1	2.10
15			>13.3		225	110	3.9	4.0
16			13.6		240	115	3.4	3.5
17			13.4		250	115	2.9	3.2
18			13.4		260		2.0	2.10
19			13.1		370		(1.6)	2.00
20			12.6		375			(2.10)
21			(12.9)		300			---
22			12.7		250		1.1	(2.55)
23			11.6		240			2.65

Time: 105.0°E.

Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 59

Sao Paulo, Brazil (23.5°S, 46.5°W)								November 1956
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00	290	16.2			<2.3		2.8	
01	280	14.8			<2.2		3.05	
02	240	13.2			<2.0		3.0	
03	260	10.8			<2.1		2.8	
04	260	9.6			<2.2		2.7	
05	270	8.4			---	3.1	2.6	
06	250	9.2			<2.6	<2.9	2.7	
07	240	10.7			115	3.0	2.7	
08	240	11.6			110	3.5	2.6	
09	---	12.3	220	---	110	3.8	2.4	
10	---	13.0	220	---	110	4.1	2.4	
11	(260)	13.6	220	5.4	---		2.4	
12	(240)	14.0	220	5.5	---		2.4	
13	---	14.2	220	5.4	110	---	2.5	
14	(260)	14.6	220	5.0	110	---	4.4	2.45
15	---	14.6	230	---	115	3.8	2.5	
16	---	14.8	240	---	120	3.4	4.2	2.55
17	260	14.0			125	2.9	3.6	2.5
18	280	14.4			<2.5	2.6	2.5	
19	350	14.0			<2.5		2.3	
20	410	14.0			<2.2	(2.2)		
21	360	(14.5)			<2.2	(2.3)		
22	340	(14.9)			<2.3	(2.6)		
23	320	(15.2)			<2.3	(2.7)		

Time: 45.0°W.

Sweep: 1.75 Mc to 20.0 Mc in 2 minutes 30 seconds.

Table 56

Alma-Ata, U.S.S.R. (43.2°N, 76.9°E)								April 1957
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00			300		7.4			2.6
01			300		7.2			2.6
02			300		7.1			2.5
03			300		6.9			2.6
04			300		6.6			2.6
05			280		7.0		(100)	E
06			250		8.3		100	2.2
07			240		10.0		100	3.0
08			240		11.5	220	4.6	3.4
09			250		12.2	220	4.7	3.8
10			250		12.6	220	5.1	4.0
11			250		13.0	210	5.2	4.1
12			250		13.0	220	5.2	4.2
13			250		13.0	220	5.0	4.1
14			250		12.7	210	4.9	3.9
15			240		12.5	220	4.7	3.7
16			240		11.8	230	4.7	3.4
17			250		11.7		100	3.0
18			250		11.2		100	2.4
19			240		10.6		100	1.5
20			240		9.3			2.6
21			250		8.8			2.7
22			270		8.4			2.7
23			280		7.8			2.6

Time: 75.0°E.

Sweep: 1.6 Mc to 17.0 Mc in 10 to 15 minutes, manual operation.

Table 57\*

Ibadan, Nigeria (7.4°N, 3.9°E)								January 1957
Time	h'F2	foF2	h'F	foF1	h'E	foE	fEs	(M3000)F2
00			8.7		270			4.1
01			8.5		270			3.8
02			8.7		265			2.9
03			>8.6		250			3.0
04			>8.5		225			3.2
05			(7.4)		220			
06			>6.7		260		(135)	5.2
07			>9.8		250		(115)	6.7
08			11.5		235		3.40	9.4
09			12.2		225		(115)	10.5
10			12.6		215		4.05	13.7
11			12.3		215		4.20	14.0
12			12.3		210		4.20	13.9
13			12.3		210		4.15	14.0
14			12.2		215		4.00	14.0
15			12.0		230		3.80	10.6
16			>11.6		245		3.35	10.3
17			>11.2		270		2.60	9.6
18			10.6		330		1.50	(6.5)
19			8.9		445			
20			(8.8)		445			
21			>8.5		380			
22			>8.4		320			
23			>8.4		290			3.8

Time: 0.0°.

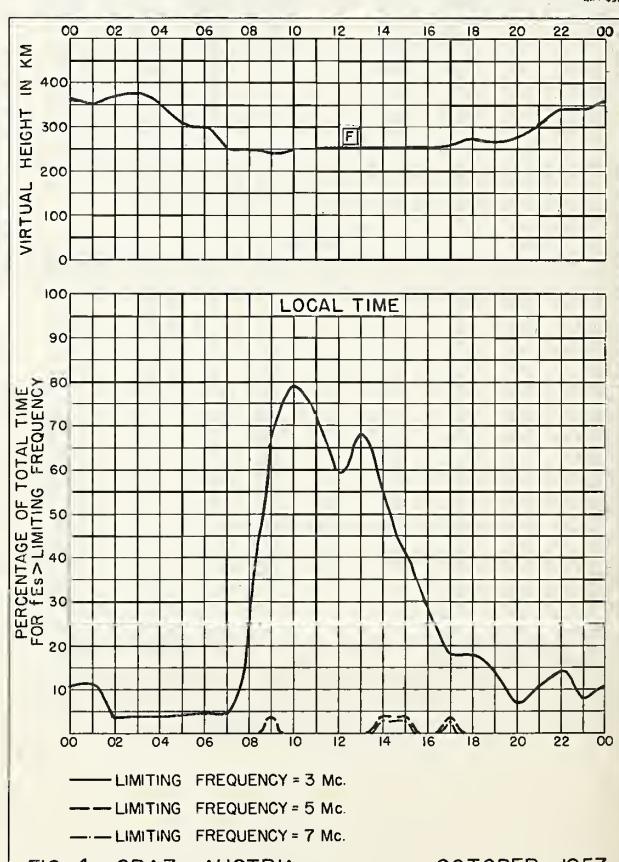
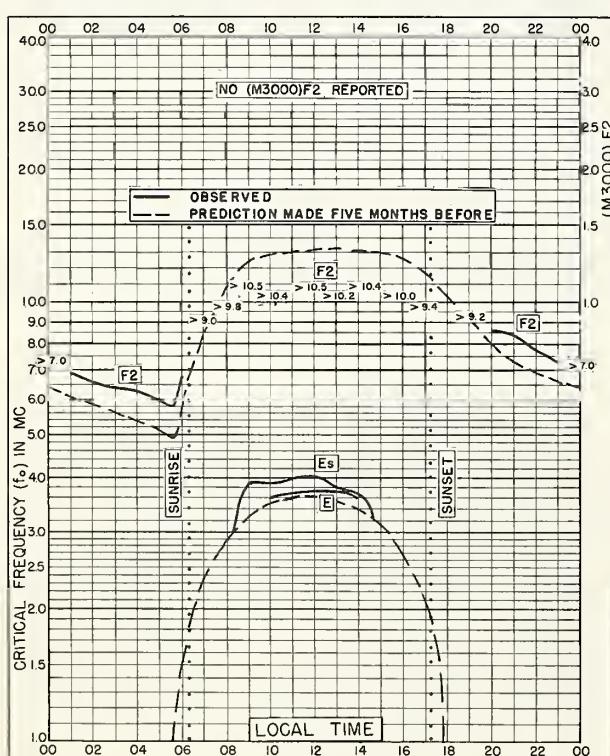
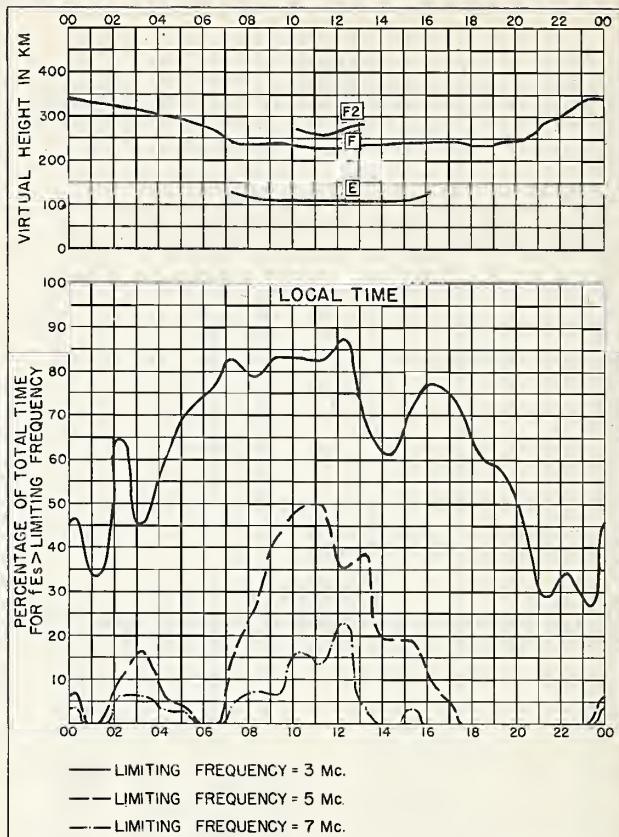
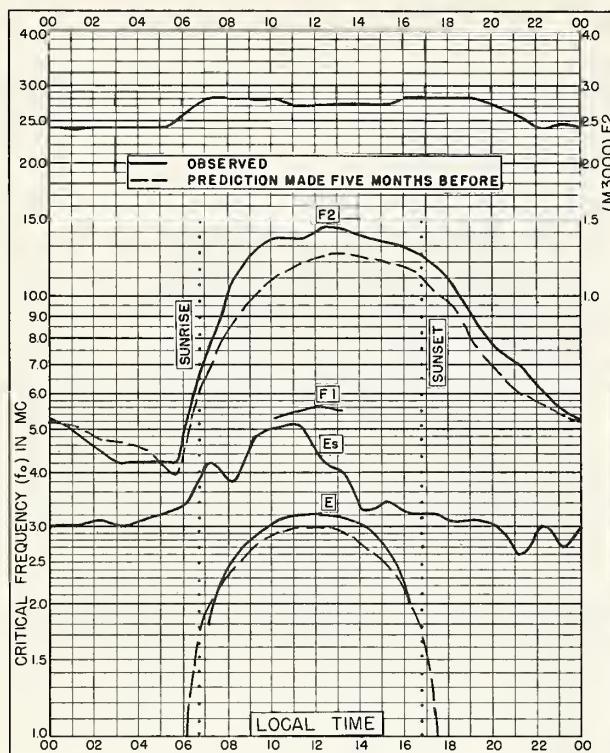
Sweep: 0.67 Mc to 25.0 Mc in 5 minutes, automatic operation.

\*Average values except foF2 and fEs, which are median values.

Table 59

Quetta, Pakistan (30.2°N, 67.0°E)								July 1956
Time	h'F2	foF2	h'F1	foF1	h'E	foE	fEs	(M3000)F2
00								
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								

Time: 75.0°E.



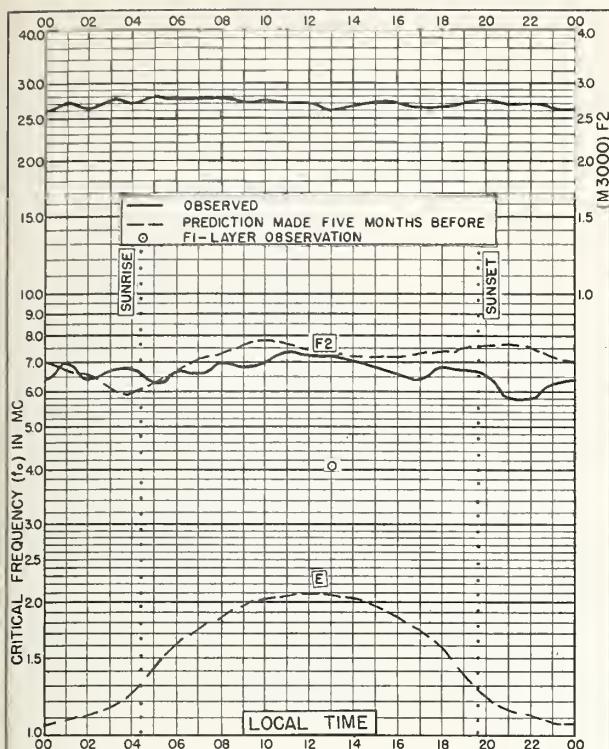


FIG. 5 FLETCHERS ICE I.  
82.0°N, 104.4°W SEPTEMBER 1957

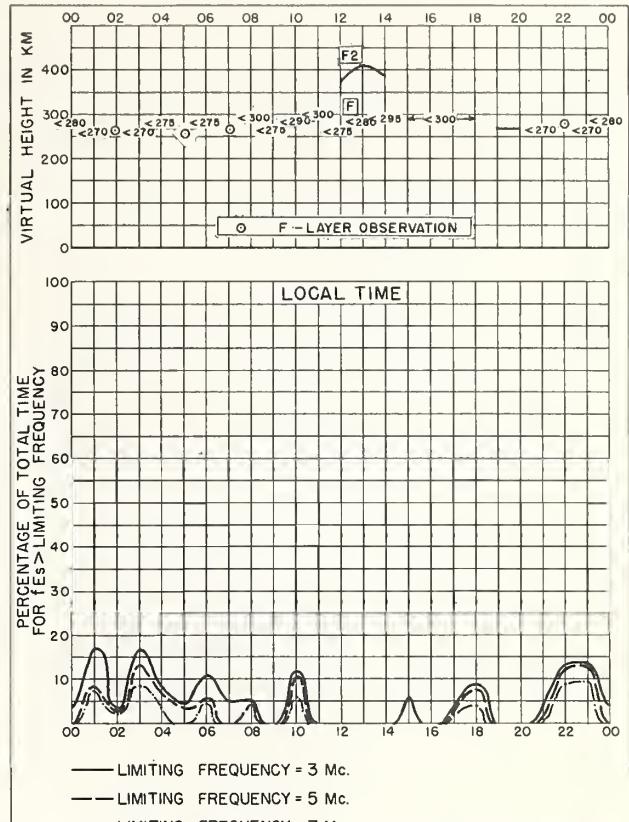


FIG. 6 FLETCHERS ICE I. SEPTEMBER 1957

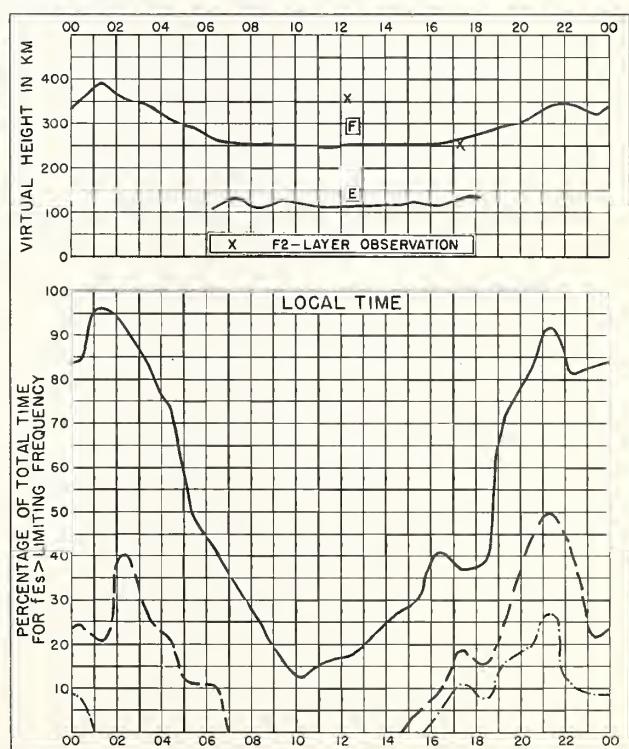
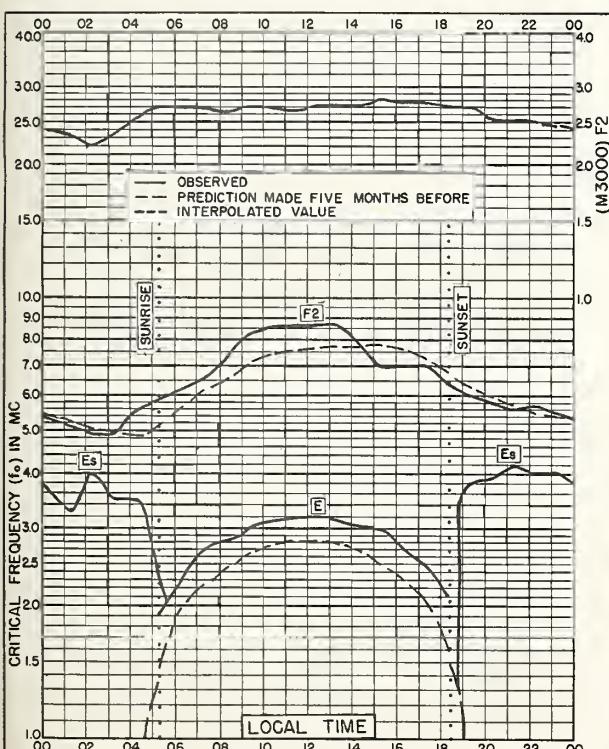


FIG. 8 TROMSO, NORWAY SEPTEMBER 1957

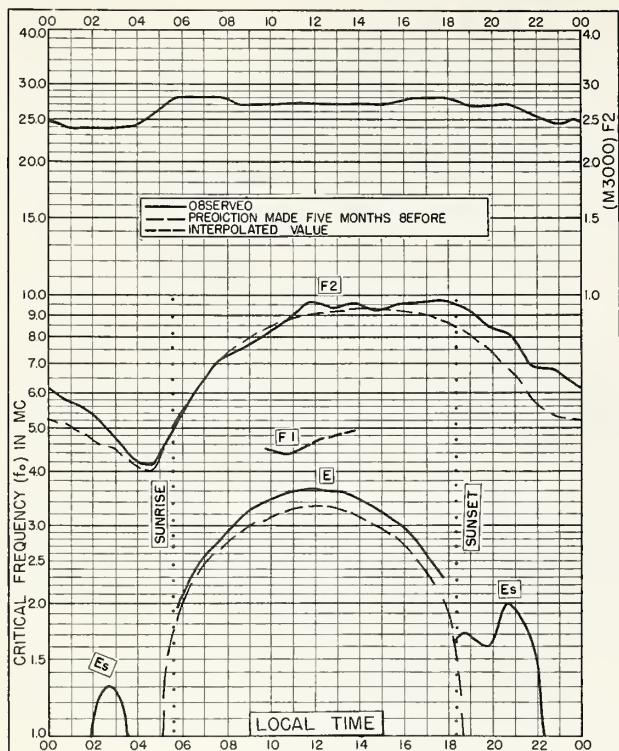


FIG. 9. OSLO, NORWAY  
60.0°N, 11.1°E SEPTEMBER 1957

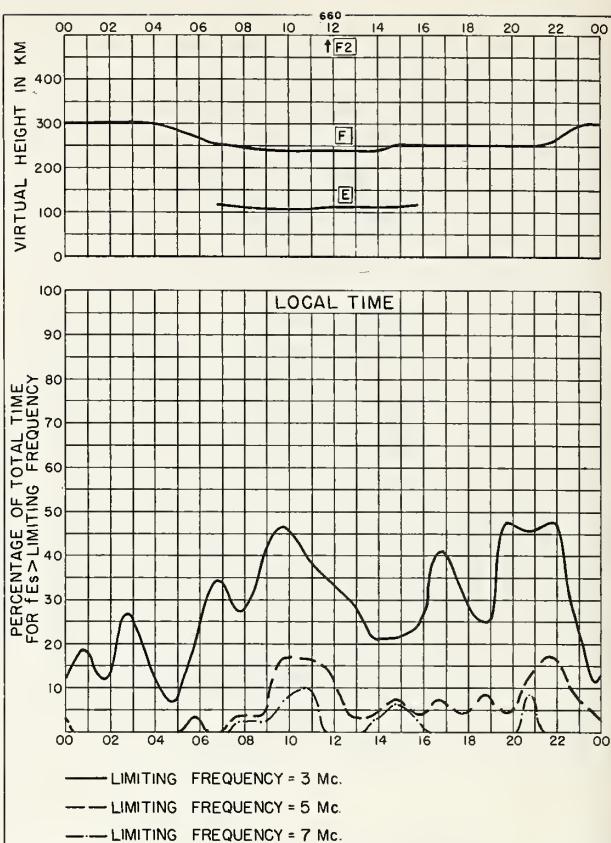


FIG. 10. OSLO, NORWAY SEPTEMBER 1957

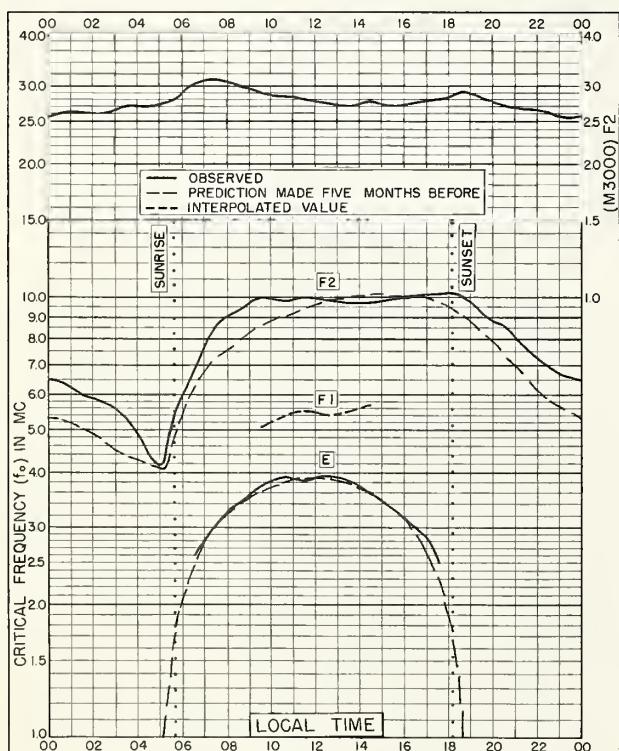


FIG. 11. ST. JOHN'S, NEWFOUNDLAND  
47.6°N, 52.7°W SEPTEMBER 1957

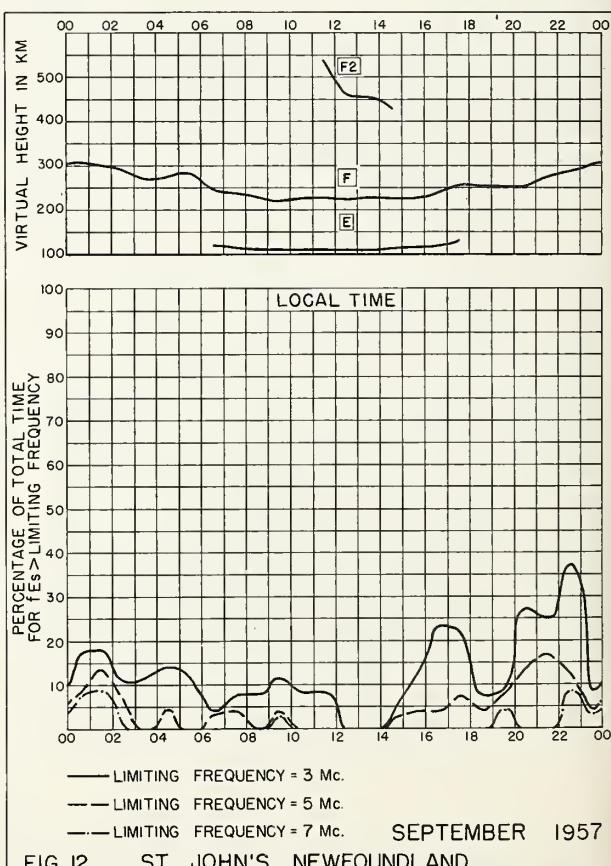


FIG. 12. ST. JOHN'S, NEWFOUNDLAND SEPTEMBER 1957

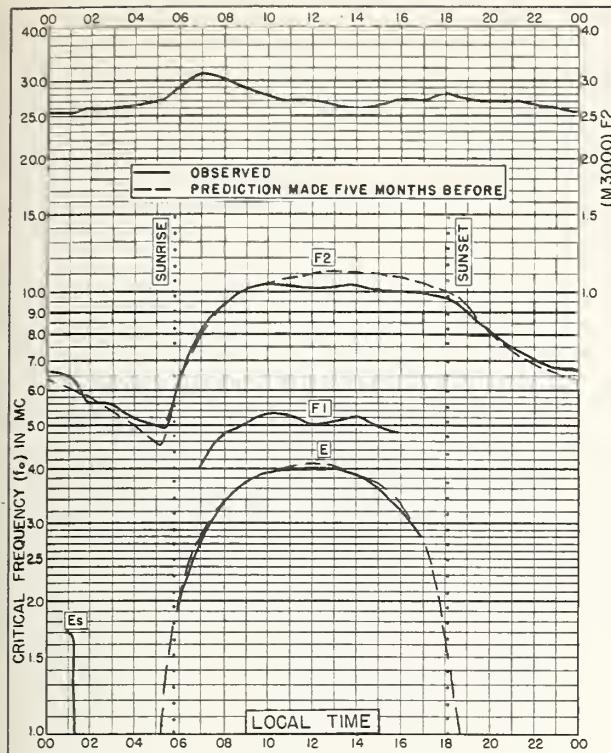


FIG. 13. WASHINGTON, D.C.  
38.7° N 77.1° W SEPTEMBER 1957

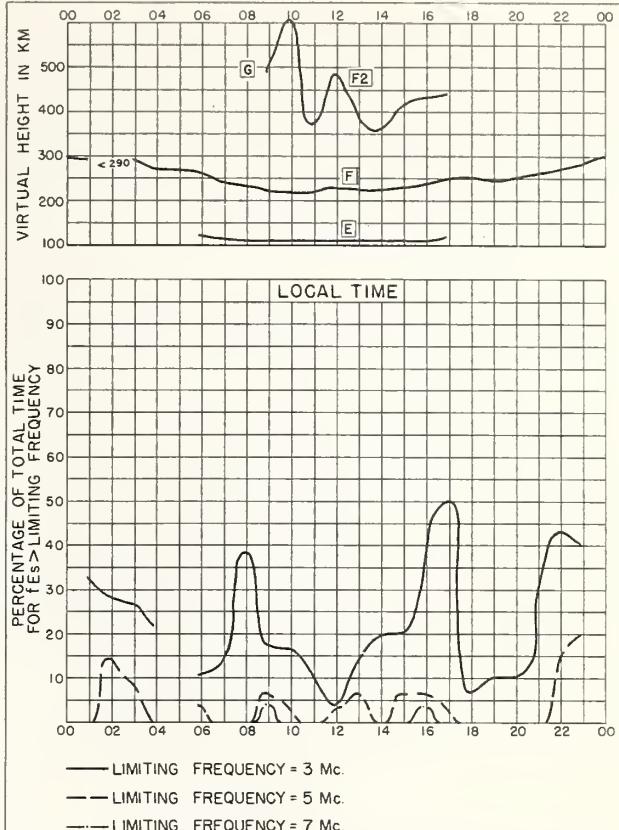


FIG. 14. WASHINGTON, D.C. SEPTEMBER 1957

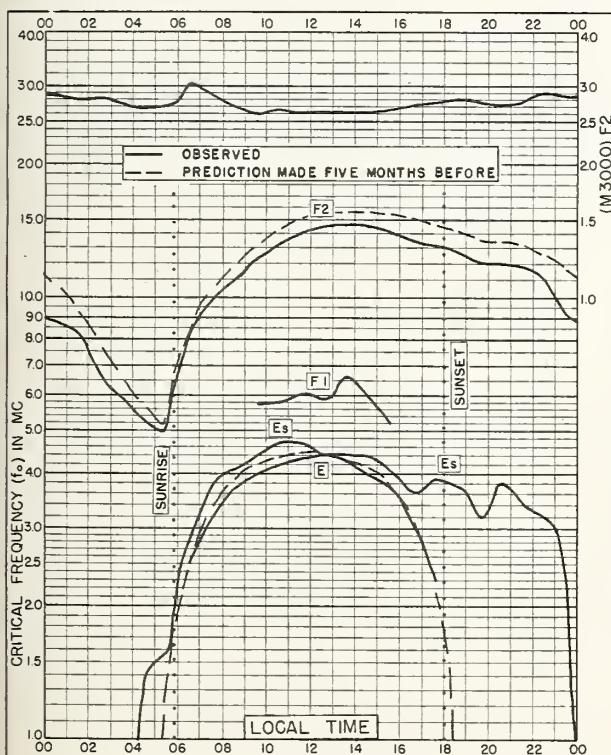


FIG. 15. MAUI, HAWAII  
20.8° N 156.5° W SEPTEMBER 1957

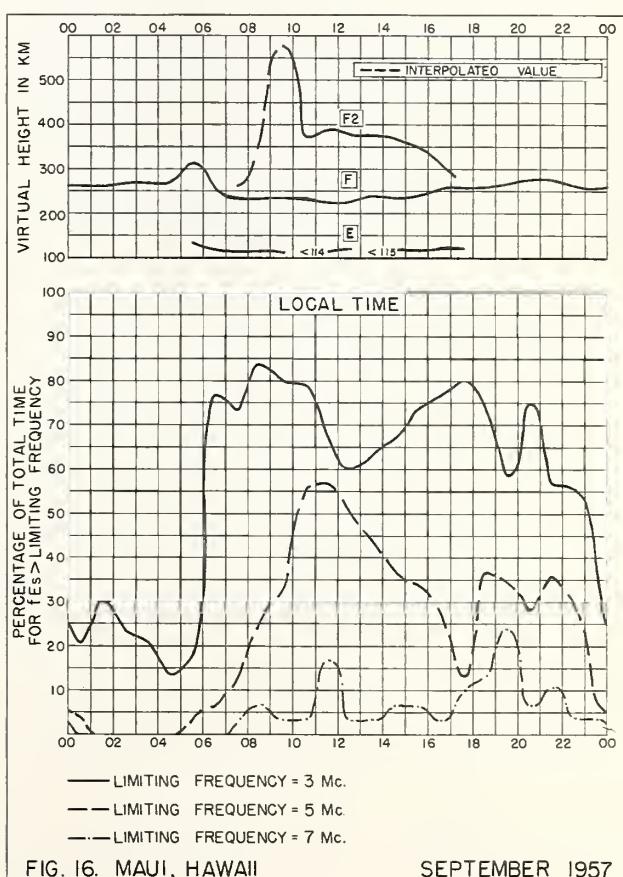


FIG. 16. MAUI, HAWAII SEPTEMBER 1957

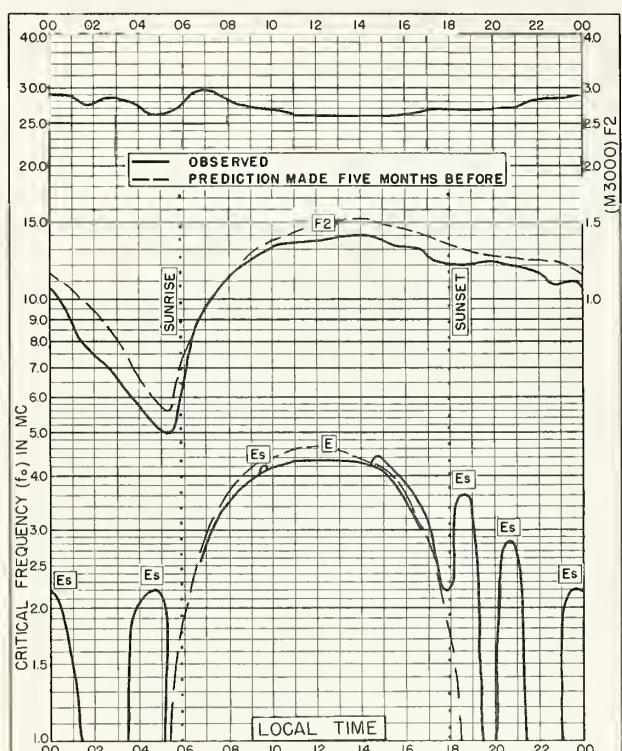


FIG. 17. PANAMA CANAL ZONE  
9.4°N, 79.9°W SEPTEMBER 1957

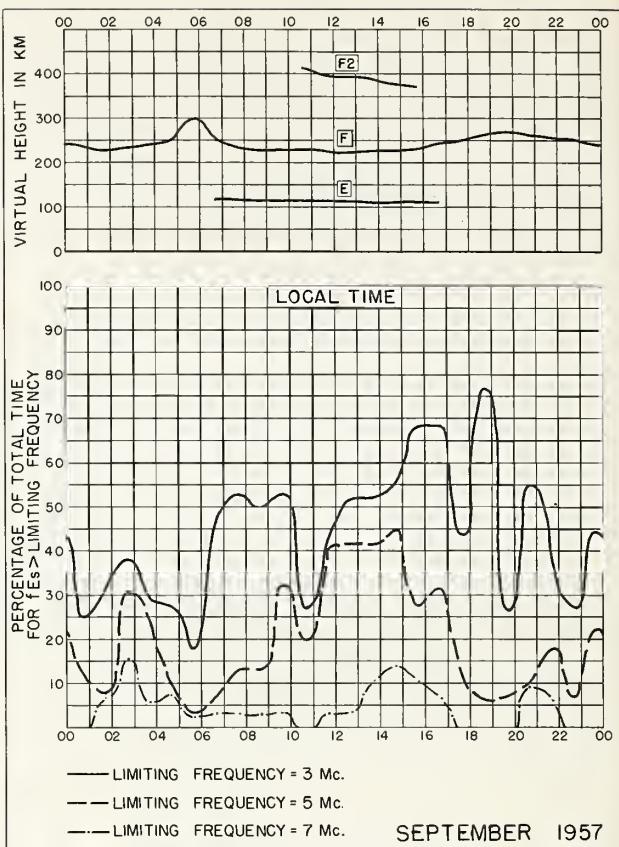


FIG. 18. PANAMA CANAL ZONE SEPTEMBER 1957

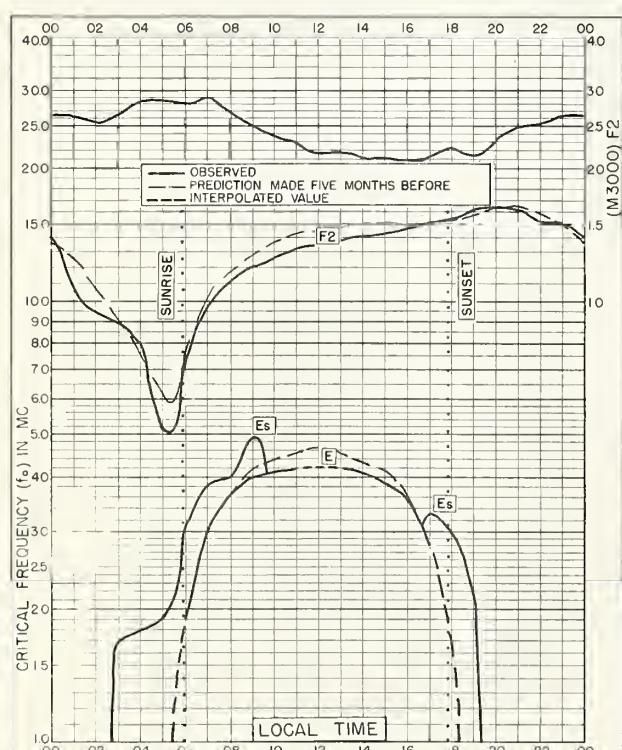


FIG. 19. LEOPOLDVILLE, BELGIAN CONGO  
4.4°S, 152°E SEPTEMBER 1957

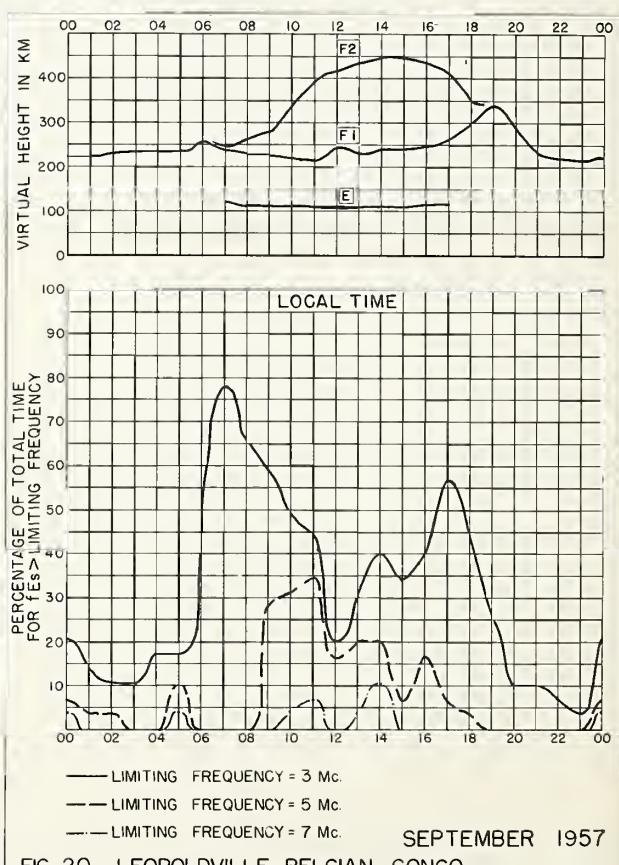
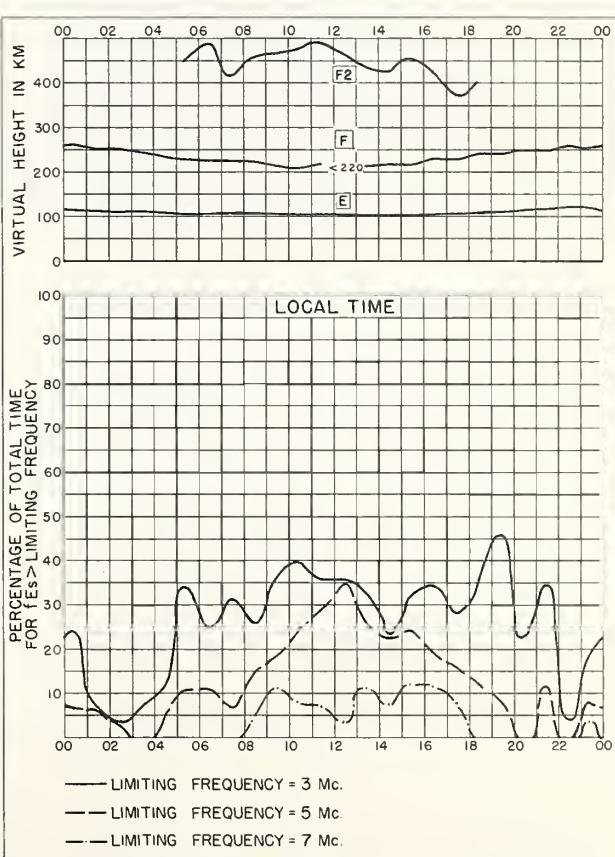
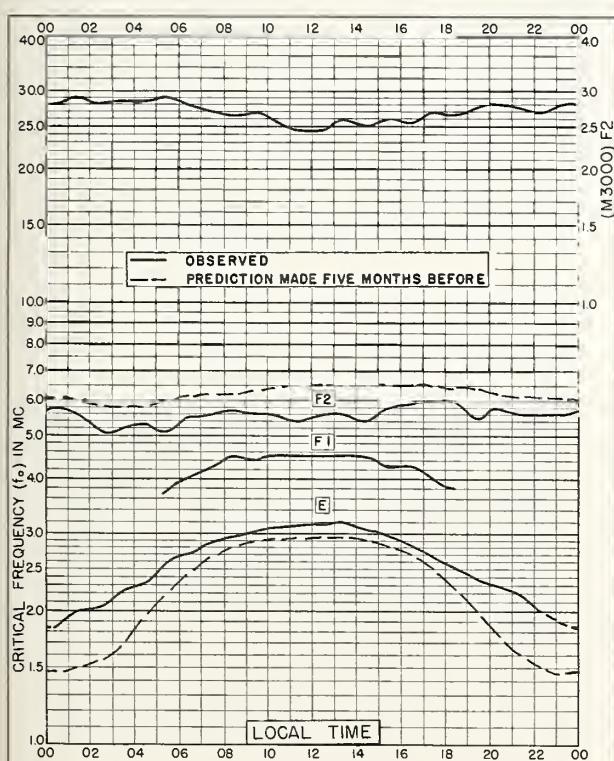
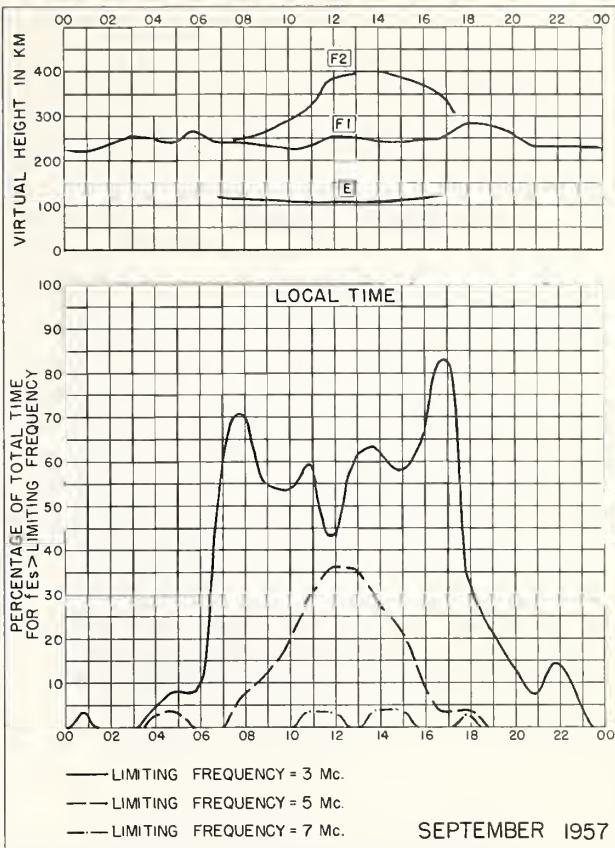
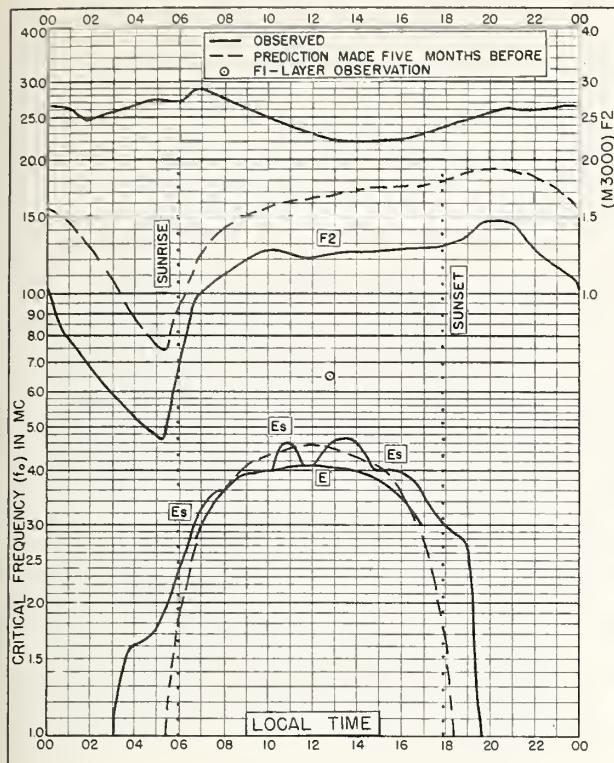


FIG. 20. LEOPOLDVILLE, BELGIAN CONGO SEPTEMBER 1957



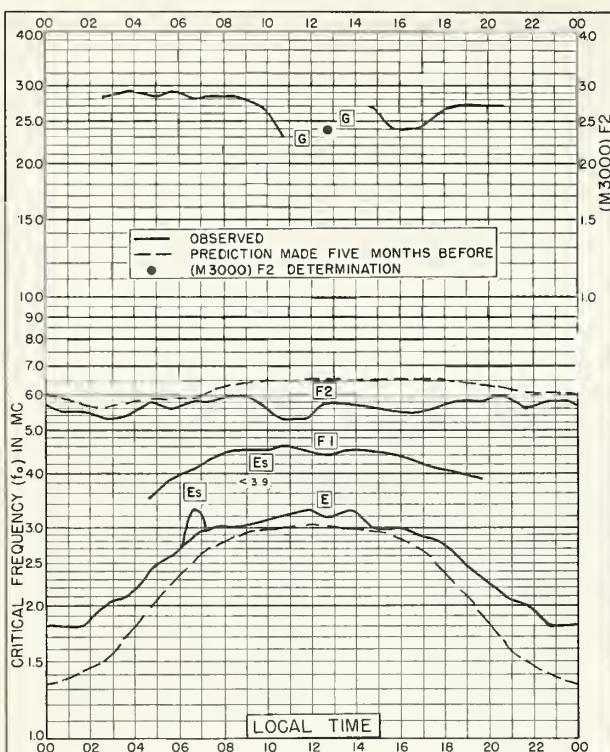


FIG. 25. RESOLUTE BAY, CANADA  
74.7°N, 94.9°W AUGUST 1957

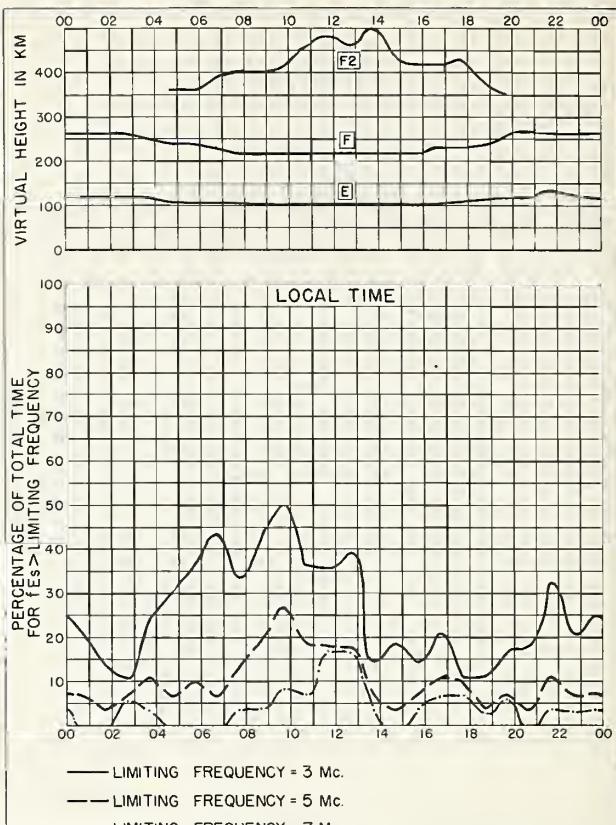


FIG. 26. RESOLUTE BAY, CANADA AUGUST 1957

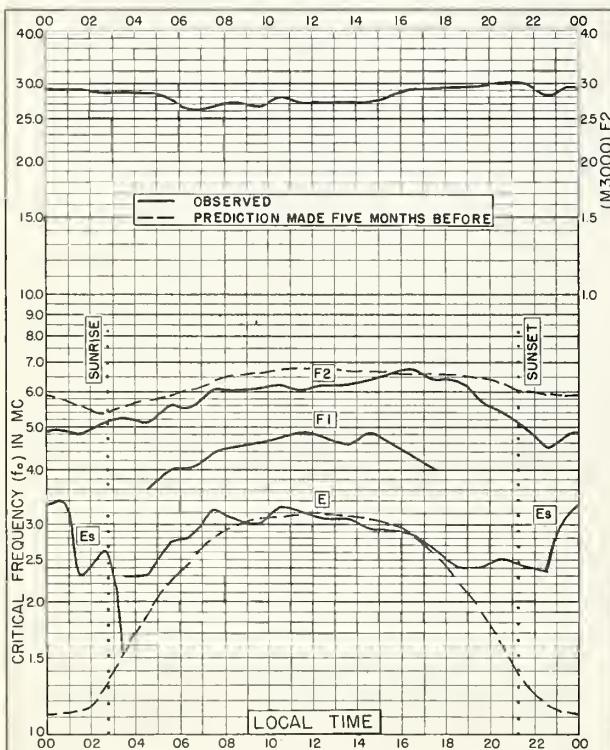


FIG. 27. POINT BARROW, ALASKA  
71.3°N 156.8°W AUGUST 1957

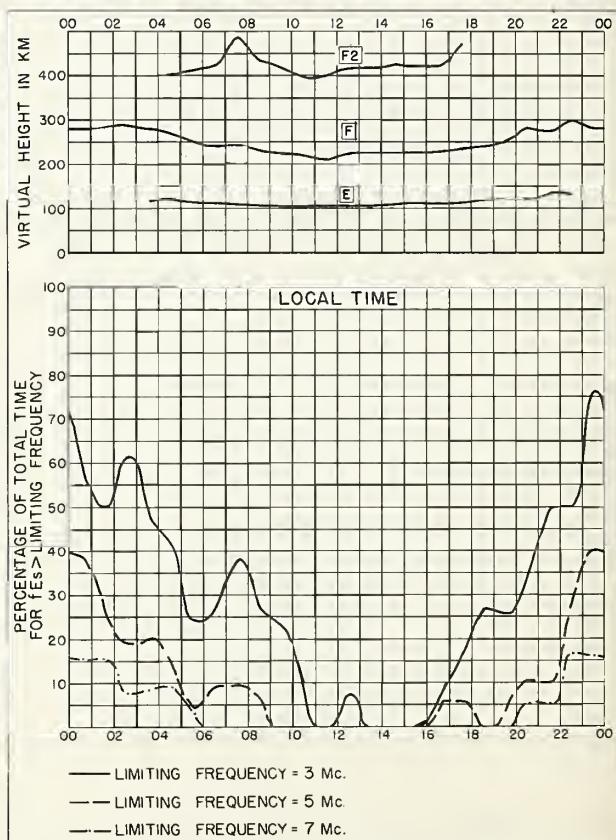
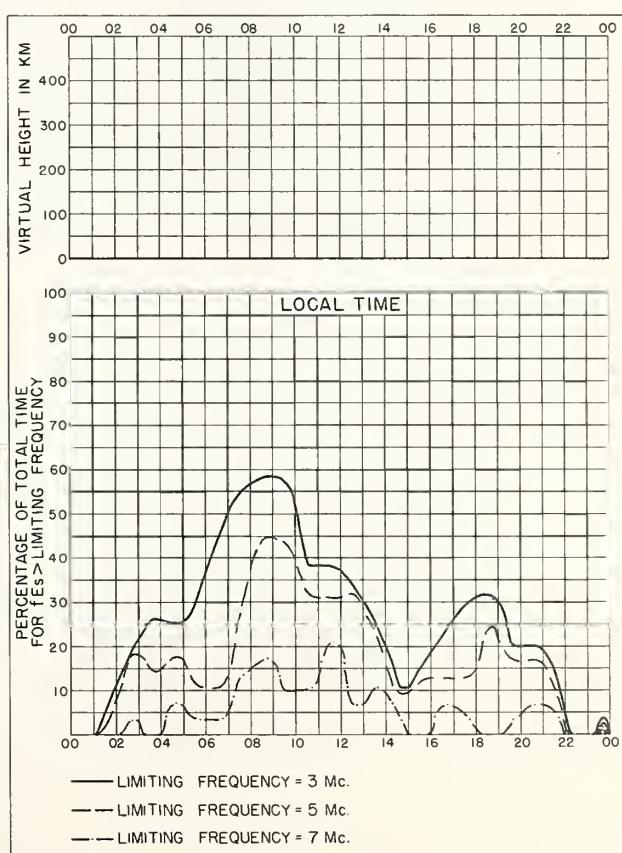
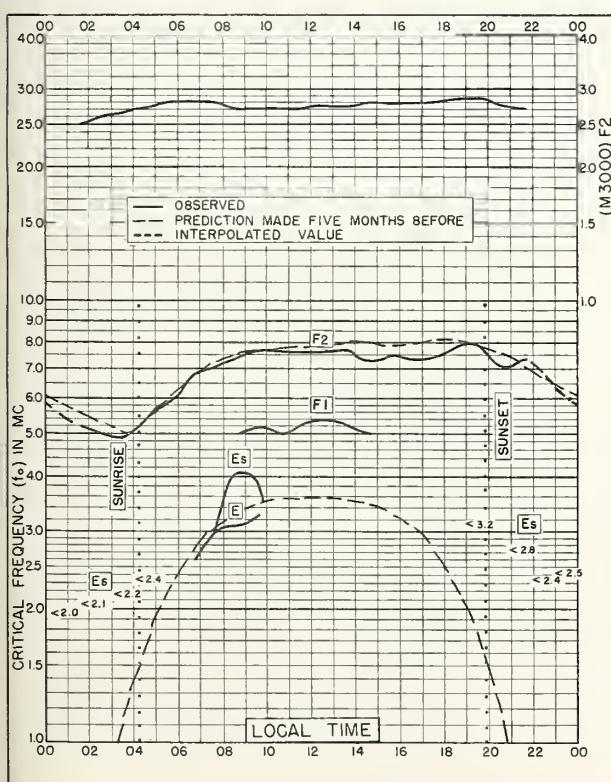
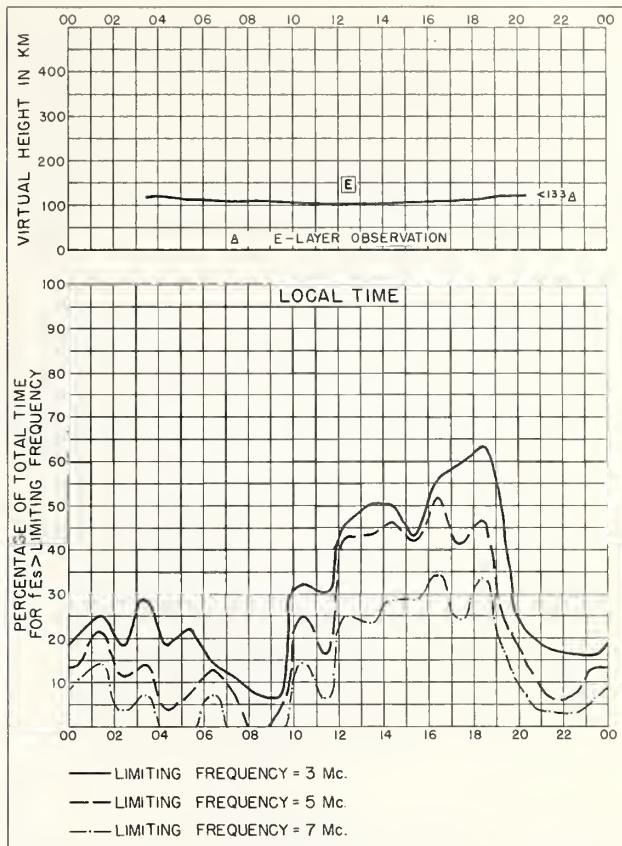
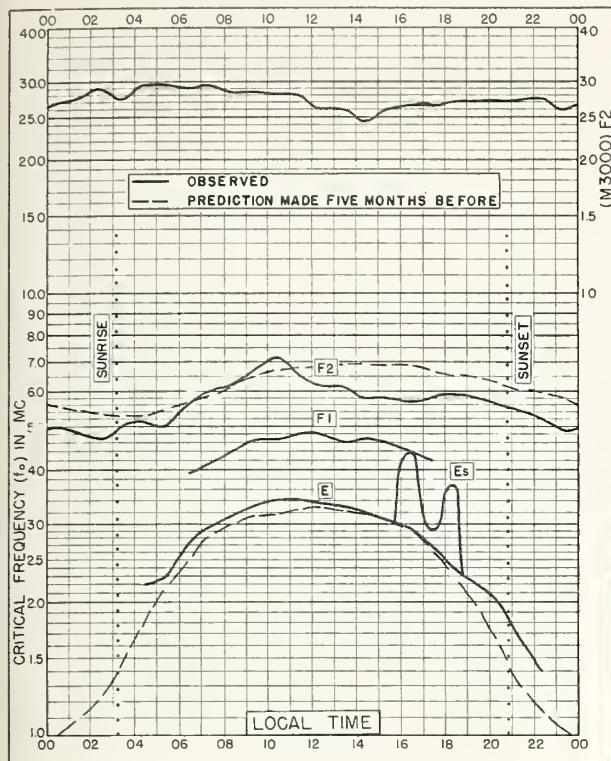


FIG. 28. POINT BARROW, ALASKA AUGUST 1957



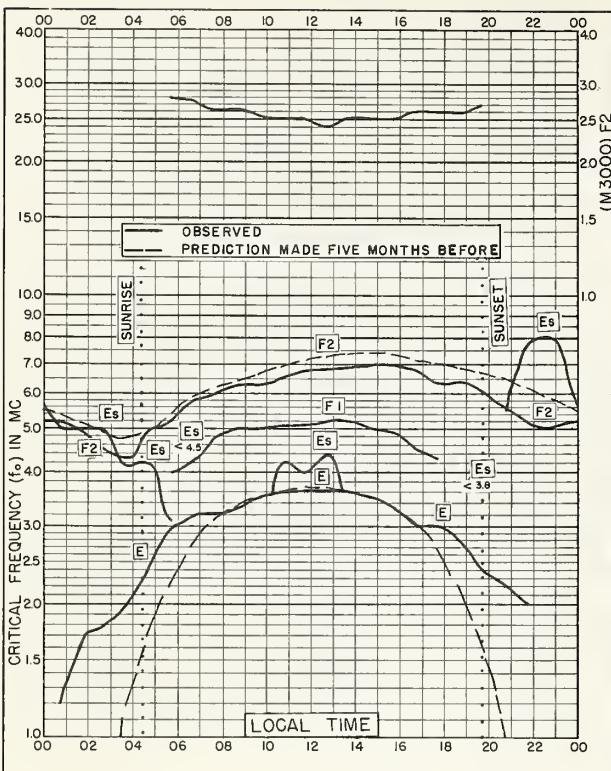


FIG. 33. CHURCHILL, CANADA  
58.8°N, 94.2°W AUGUST 1957

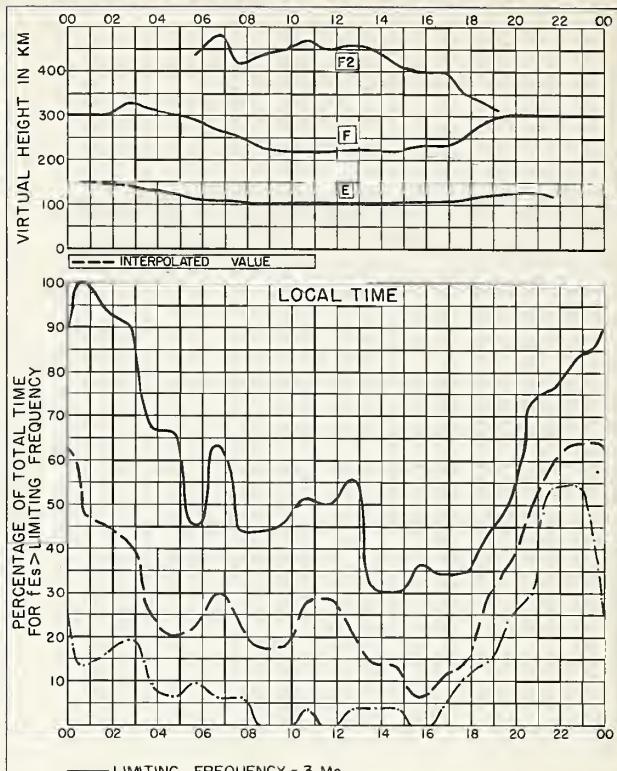


FIG. 34. CHURCHILL, CANADA AUGUST 1957

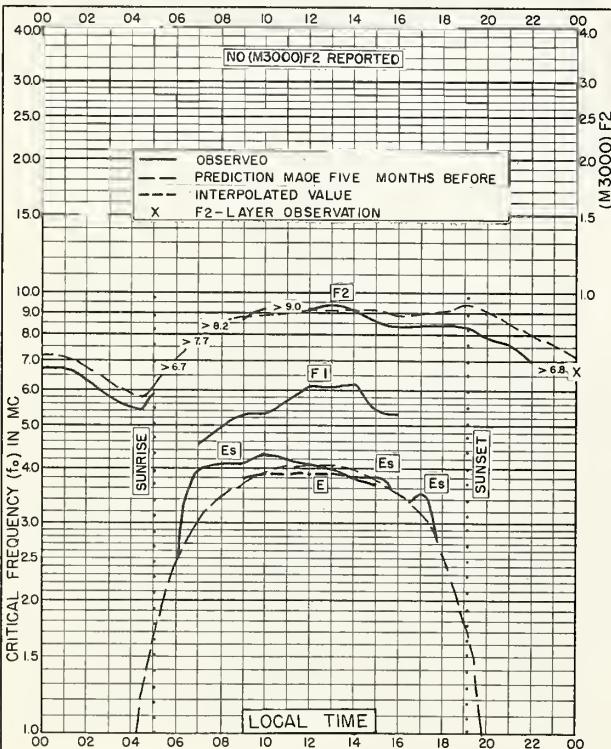


FIG. 35. GRAZ, AUSTRIA  
 47.1° N 15.5° E AUGUST 1957

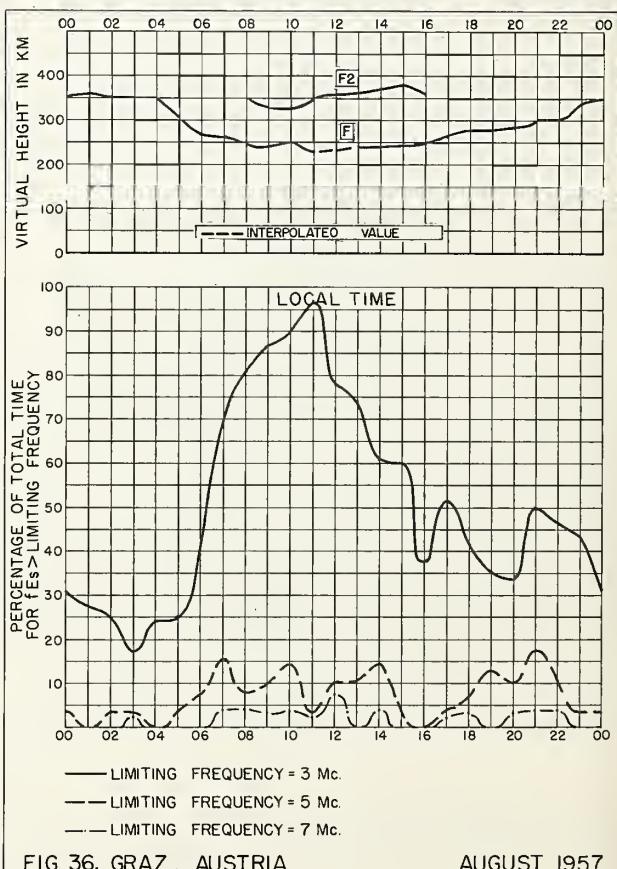


FIG. 36. GRAZ, AUSTRIA AUGUST 1957

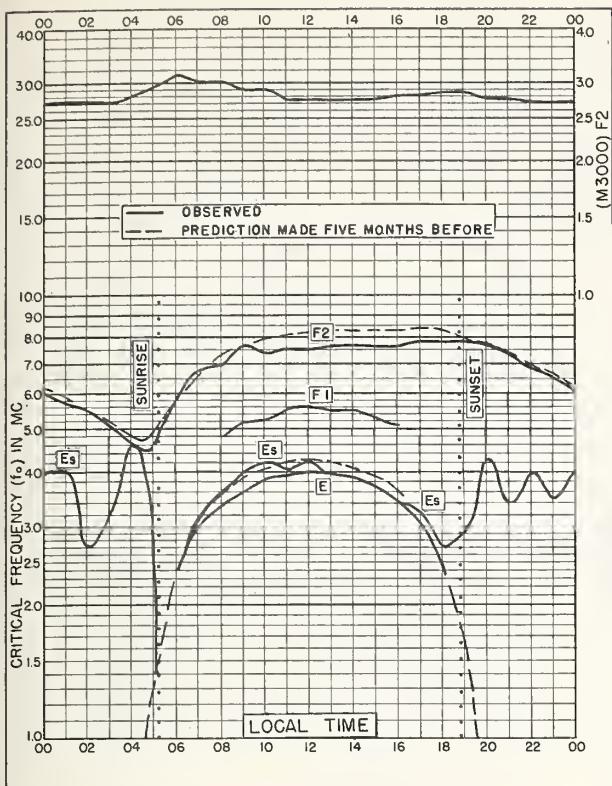
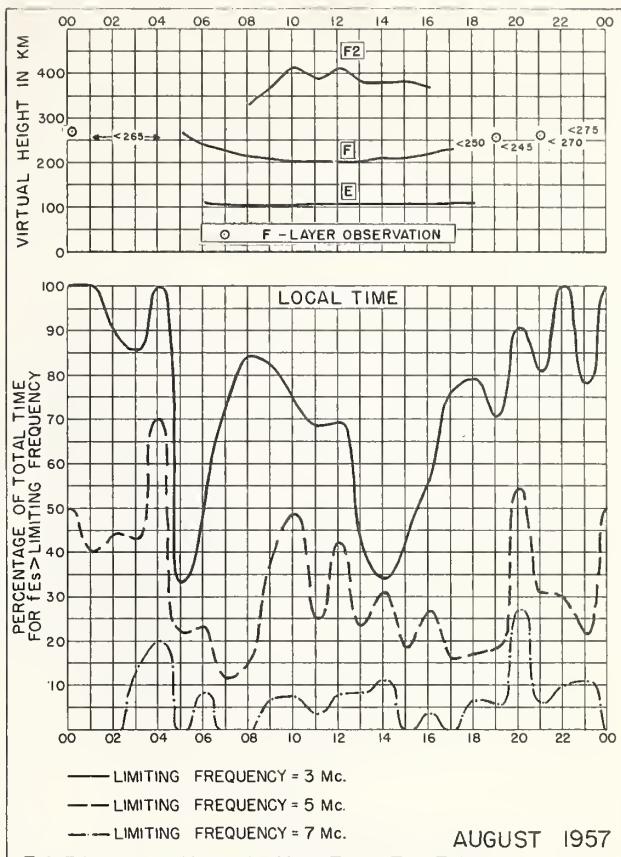


FIG. 37. FT. MONMOUTH, NEW JERSEY  
40.3°N, 74.1°W AUGUST 1957



AUGUST 1957  
FIG. 38. FT. MONMOUTH, NEW JERSEY

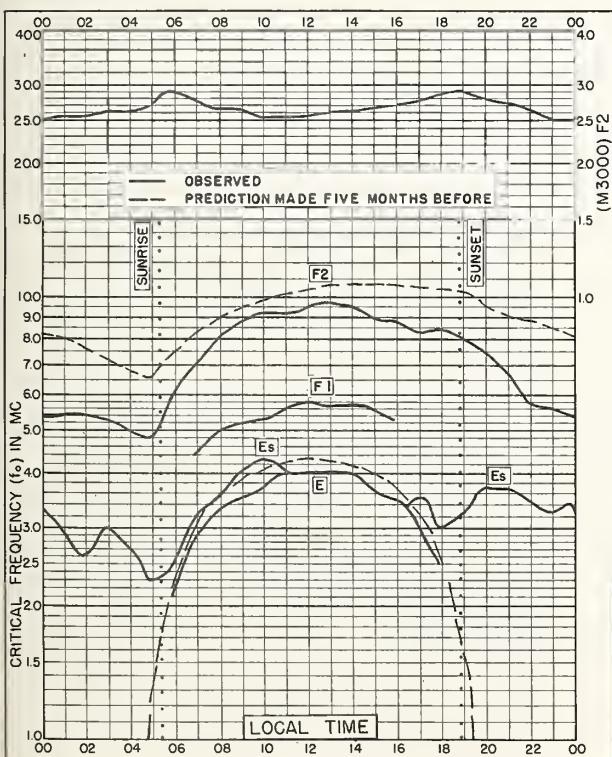
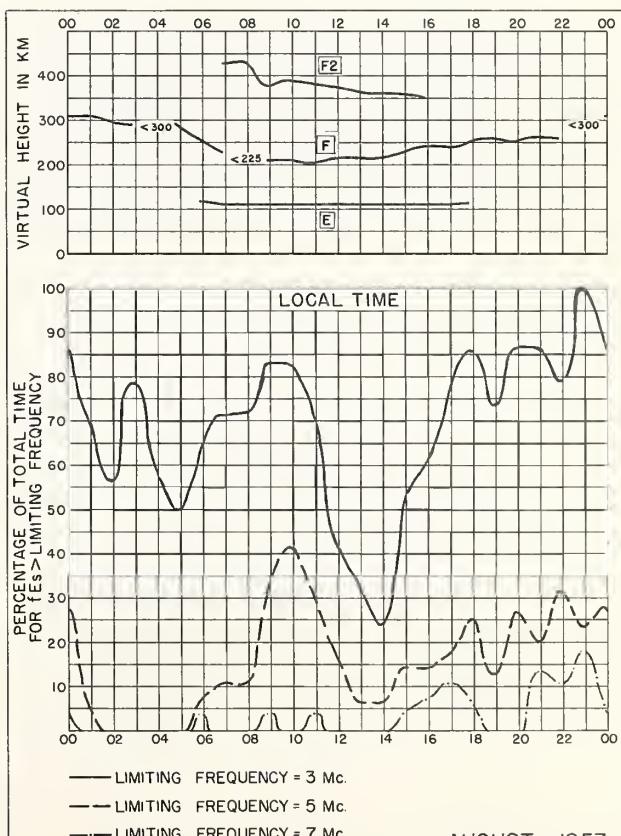
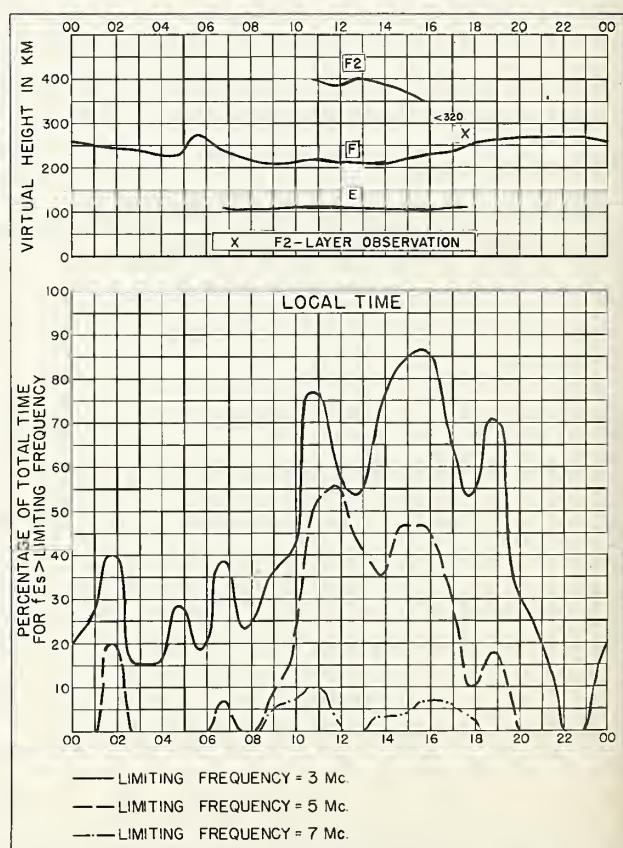
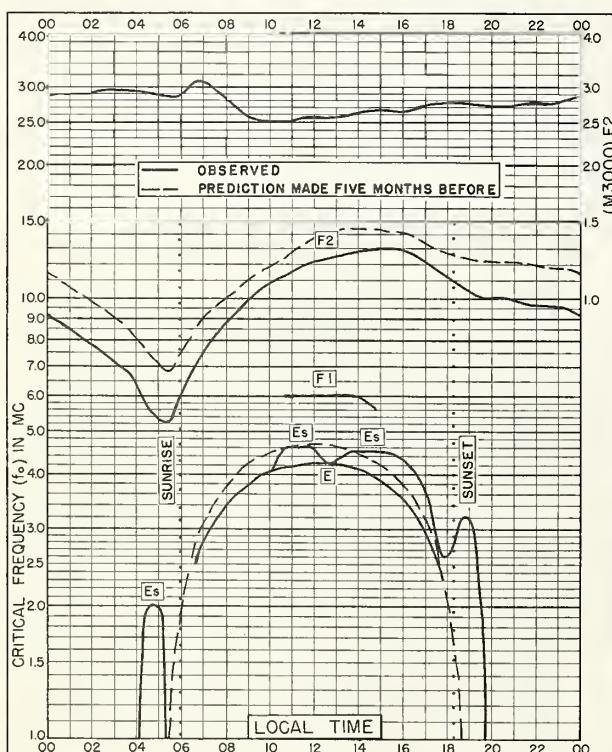
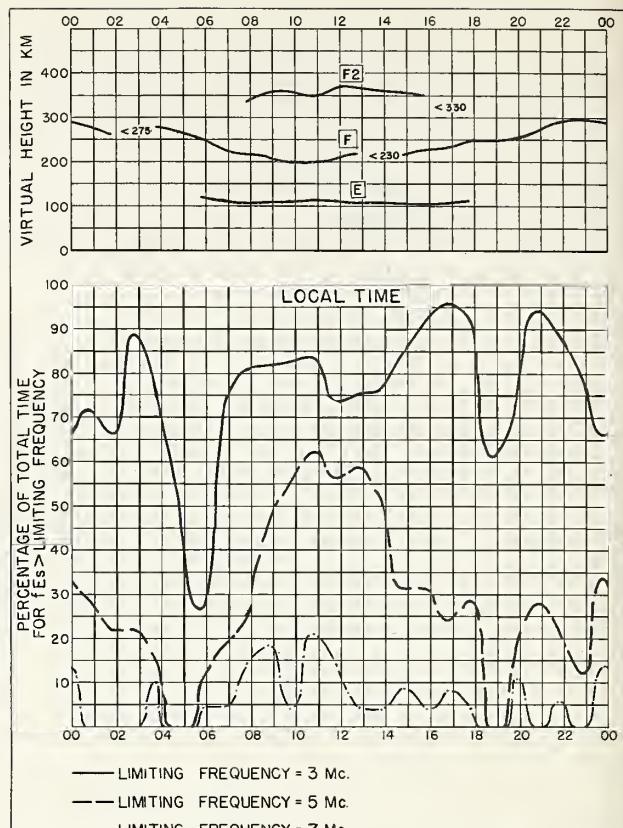
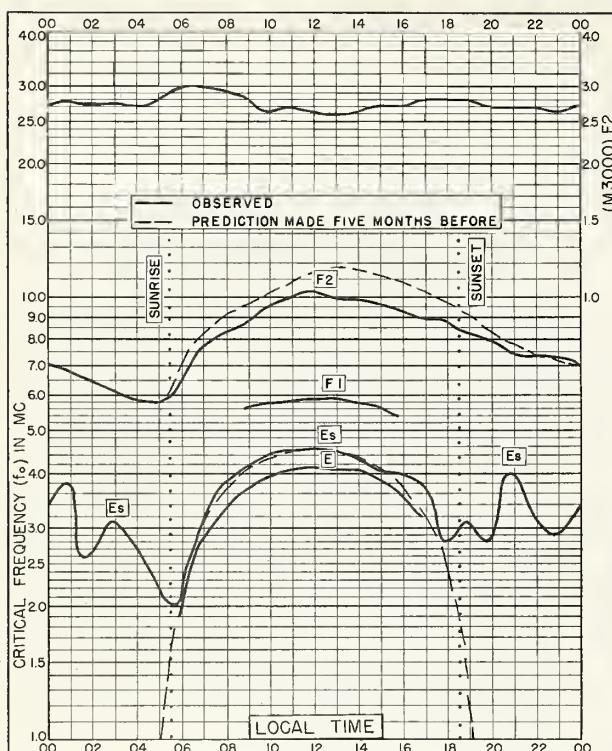


FIG. 39. SAN FRANCISCO, CALIFORNIA  
37.4°N, 122.2°W AUGUST 1957



AUGUST 1957  
FIG. 40. SAN FRANCISCO, CALIFORNIA



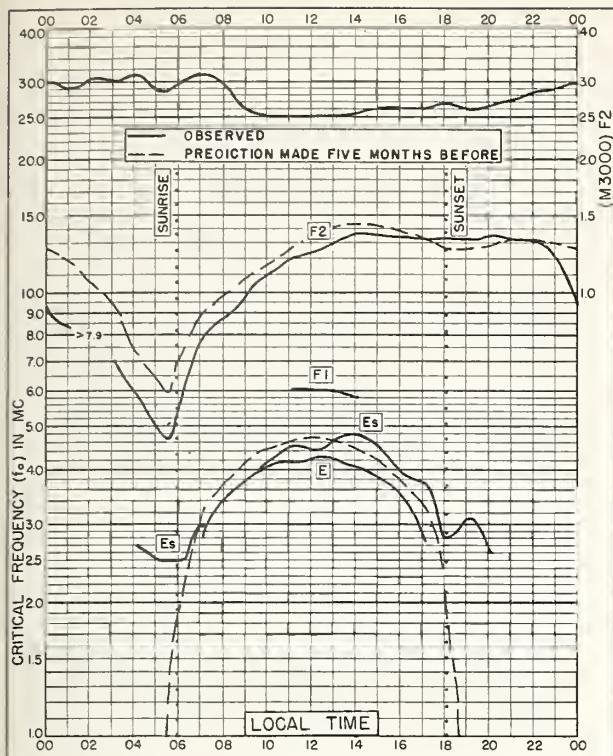


FIG. 45. BOGOTA, COLOMBIA  
4.5°N, 74.2°W AUGUST 1957

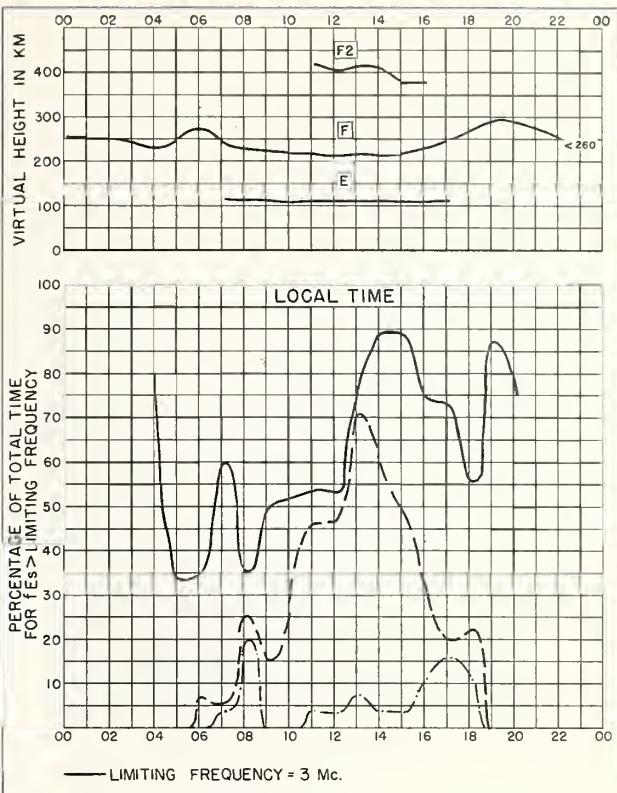


FIG. 46. BOGOTA, COLOMBIA AUGUST 1957

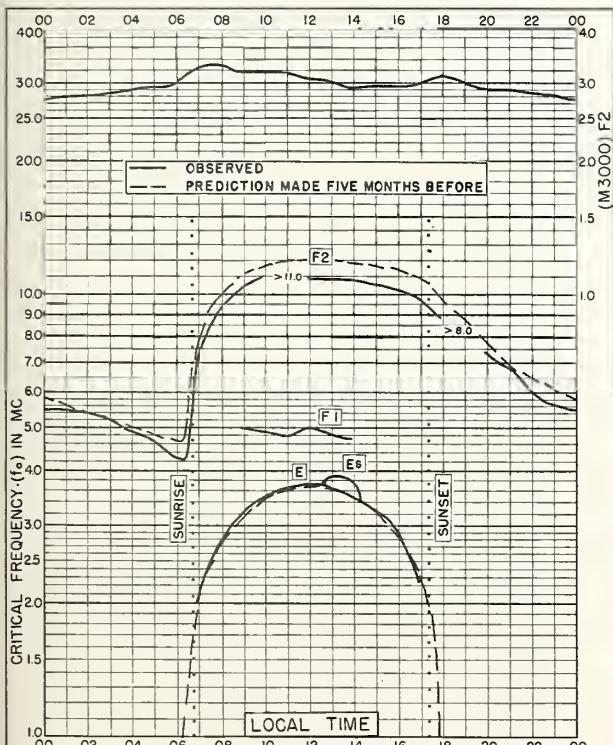


FIG. 47. CANBERRA, AUSTRALIA  
35.3°S 149.0°E AUGUST 1957

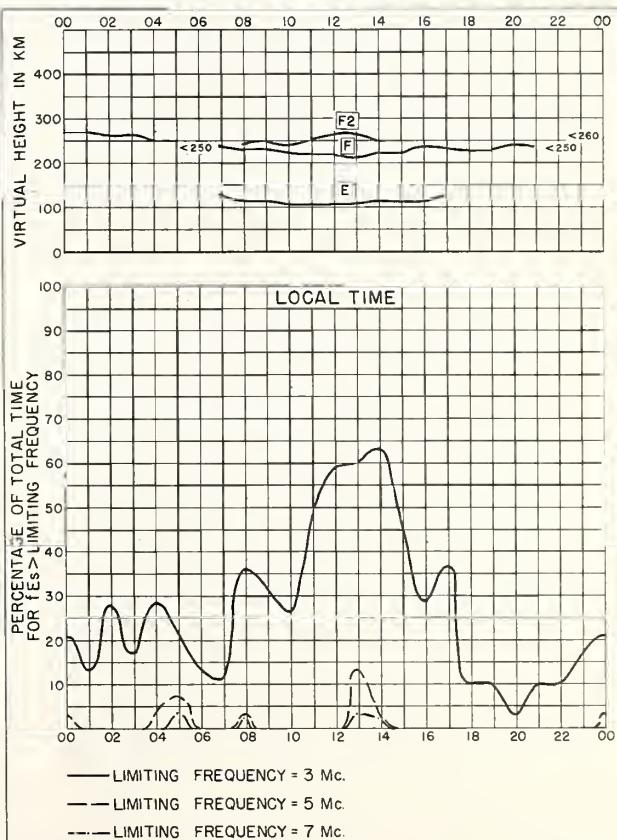
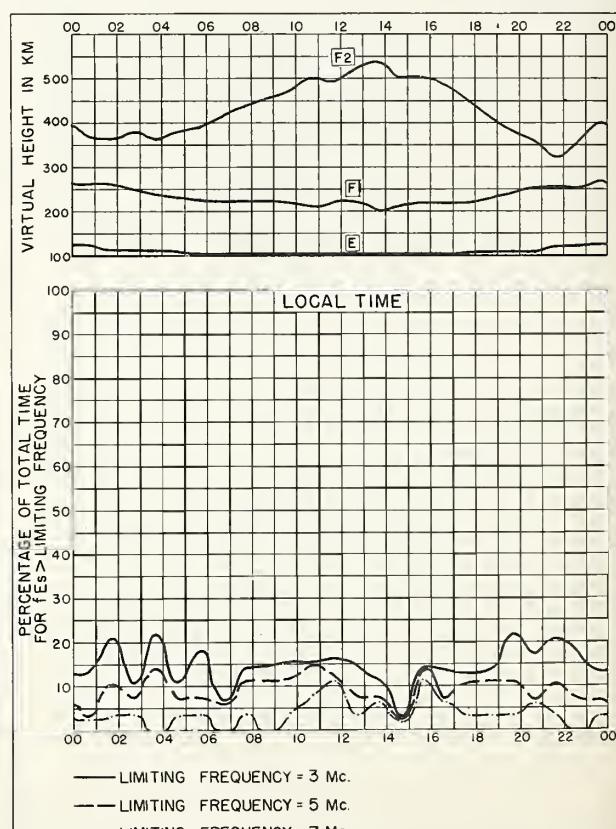
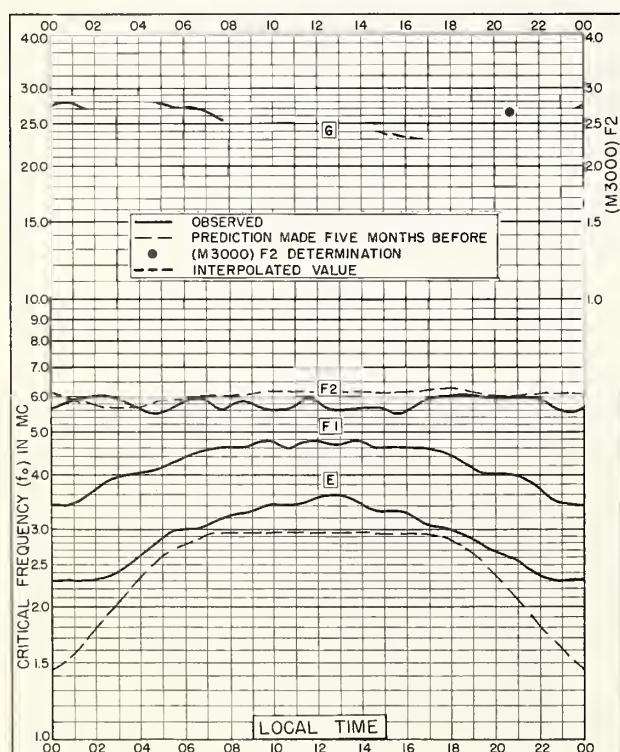
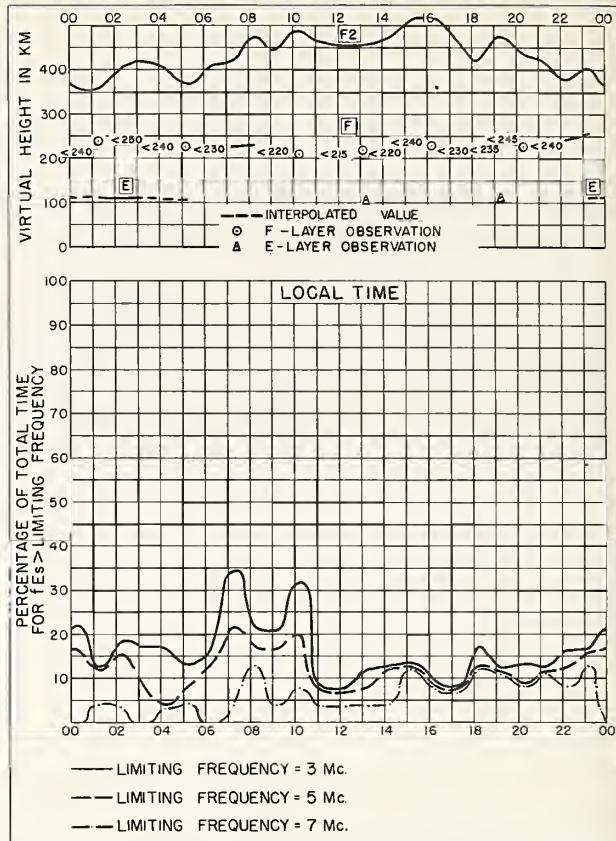
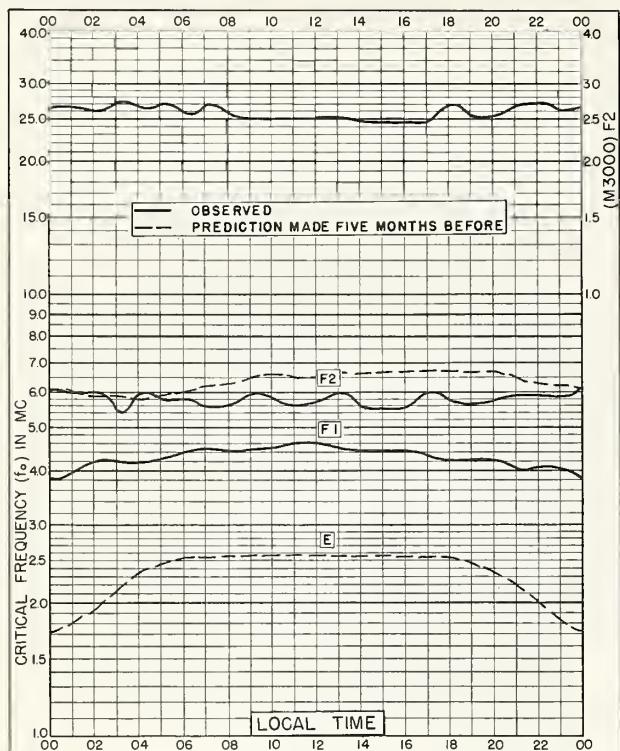
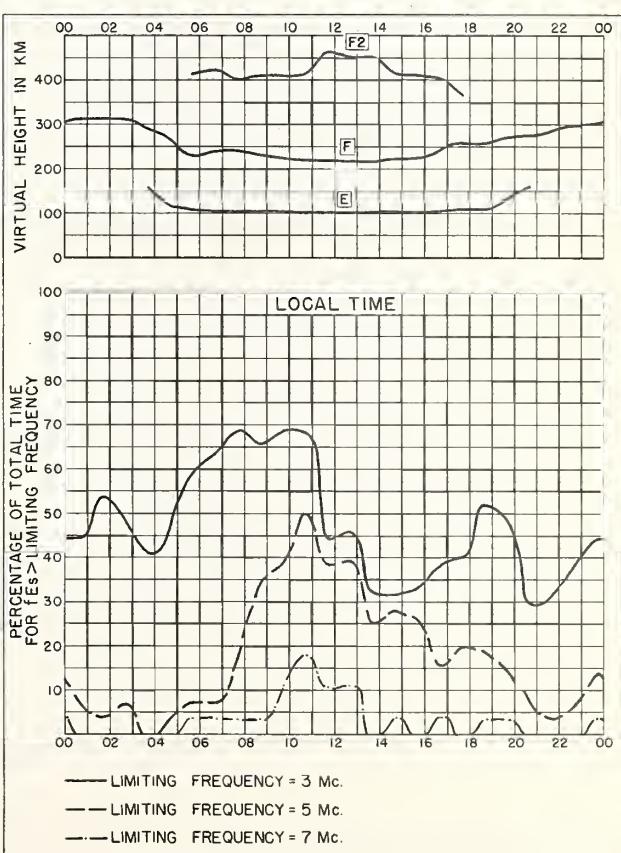
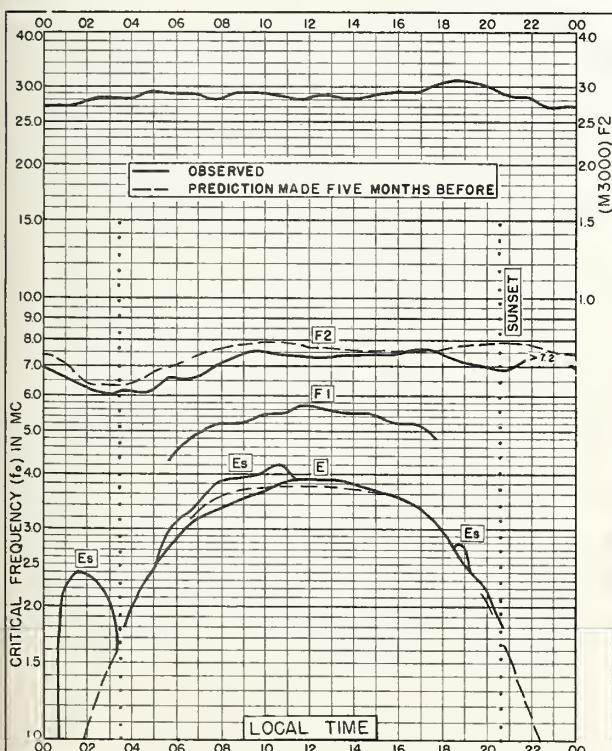
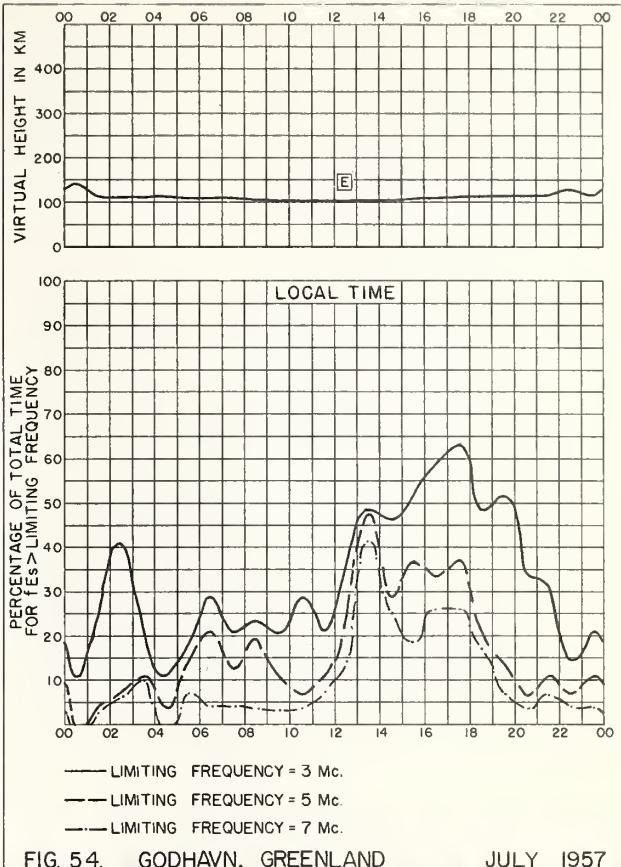
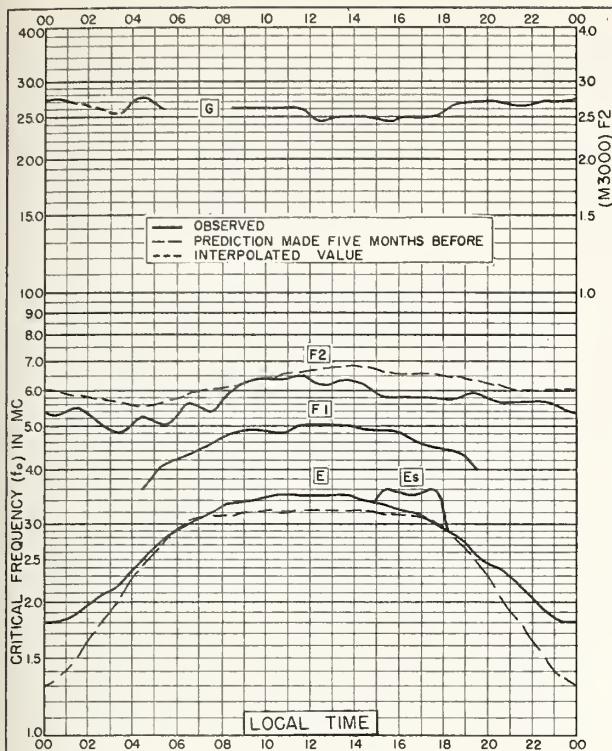
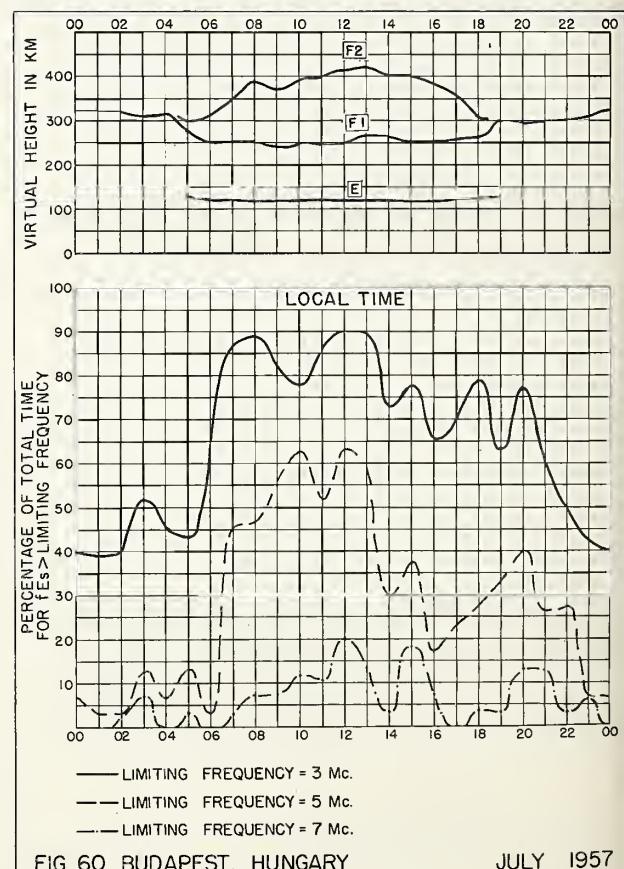
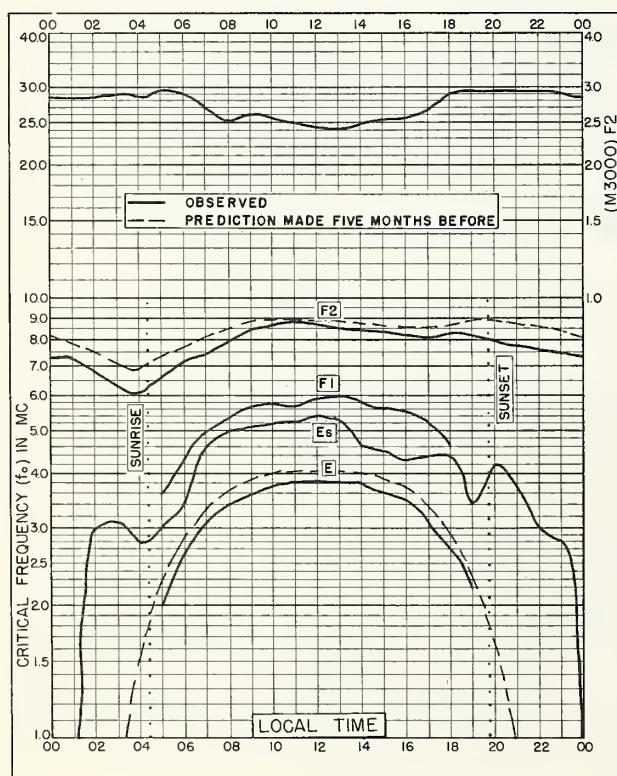
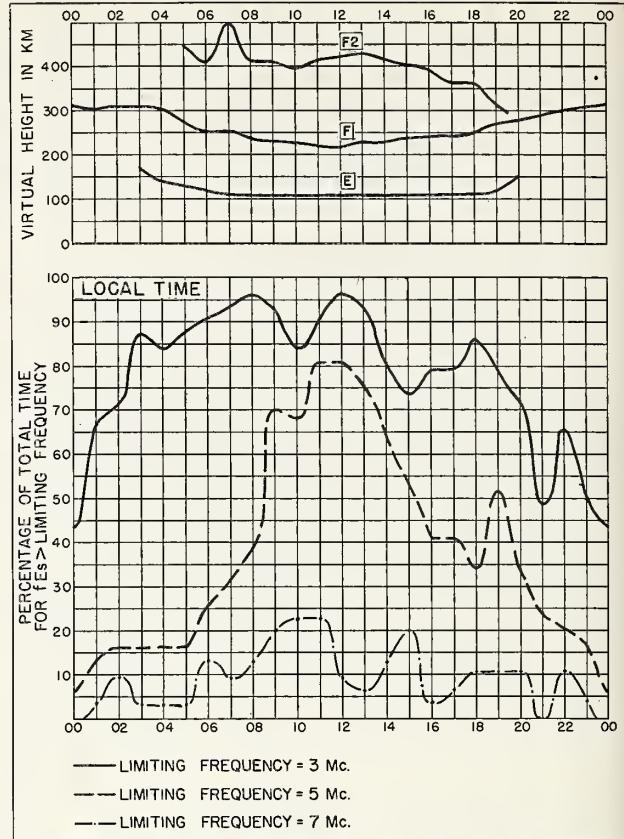
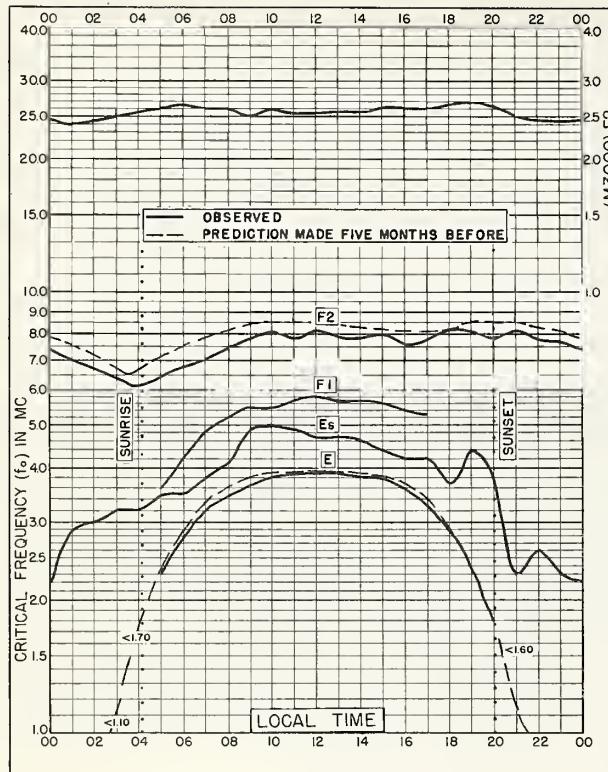
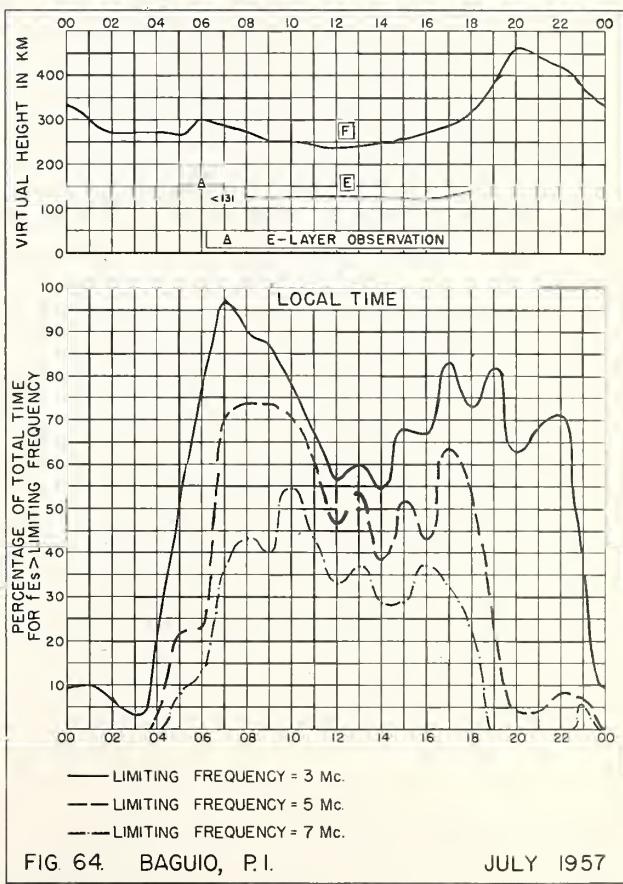
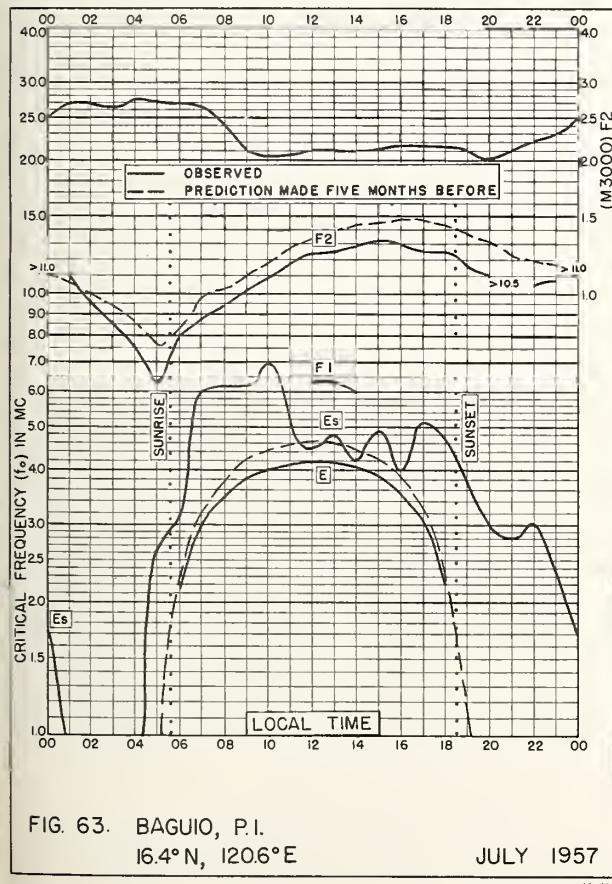
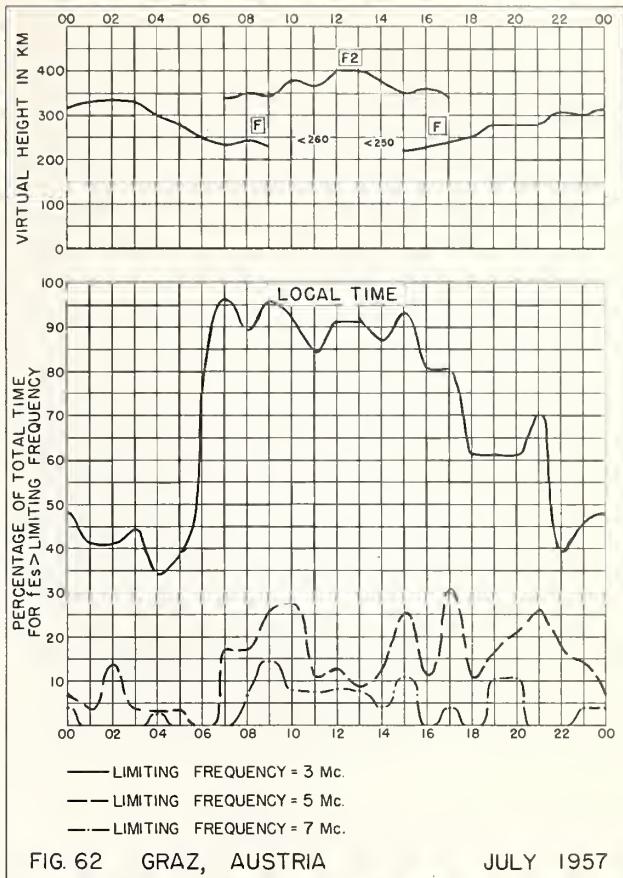
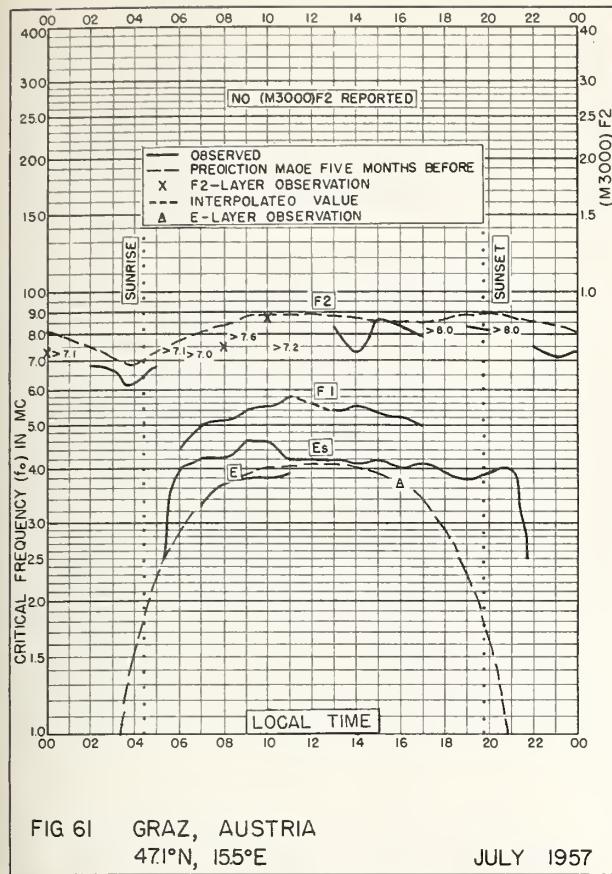


FIG. 48. CANBERRA, AUSTRALIA AUGUST 1957









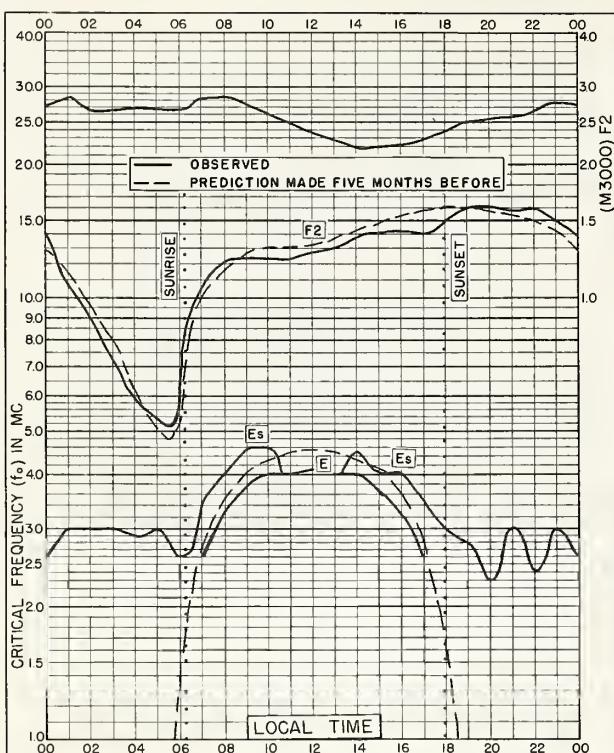


FIG. 65. LEOPOLDVILLE, BELGIAN CONGO  
44° S 15.2° E JULY 1957

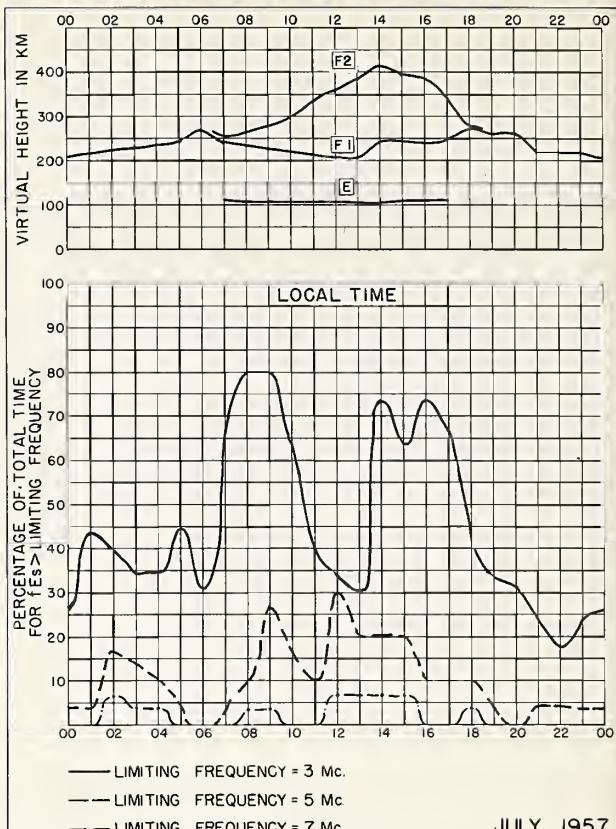


FIG. 66. LEOPOLDVILLE, BELGIAN CONGO JULY 1957

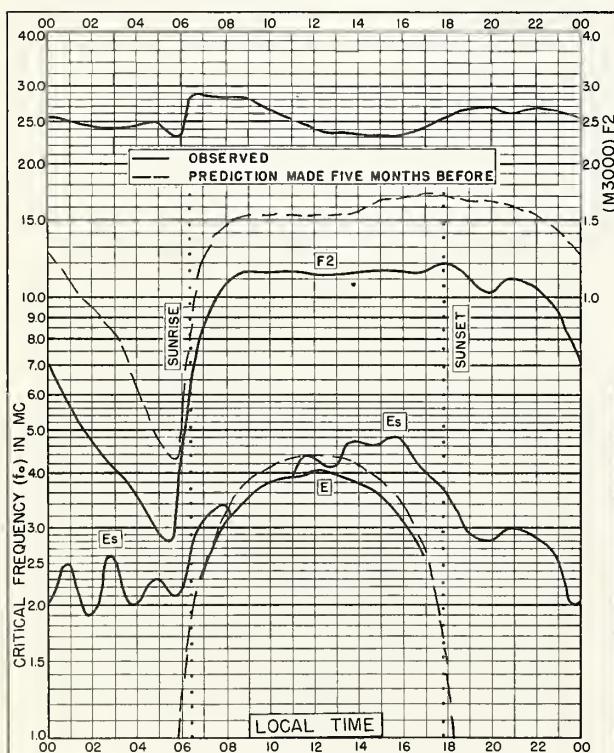


FIG. 67. ELISABETHVILLE, BELGIAN CONGO  
116°S, 27.5°E JULY 1957

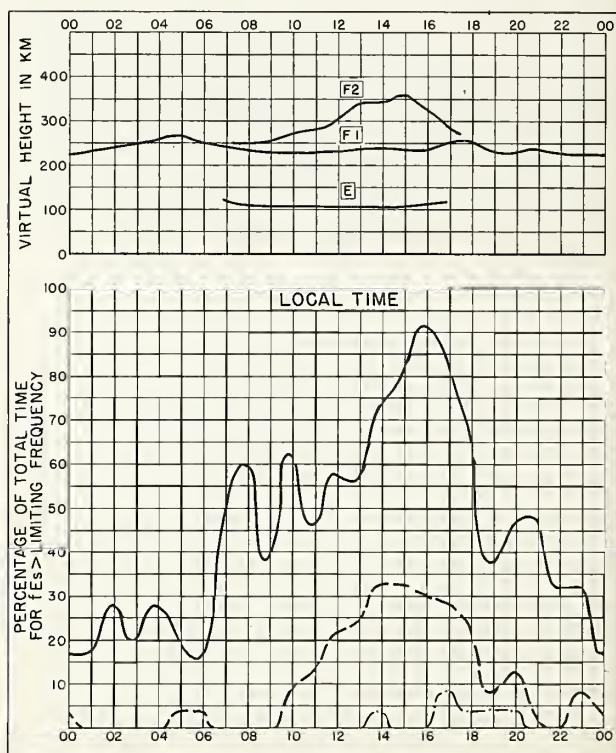


FIG. 68. ELISABETHVILLE, BELGIAN CONGO JULY 1957

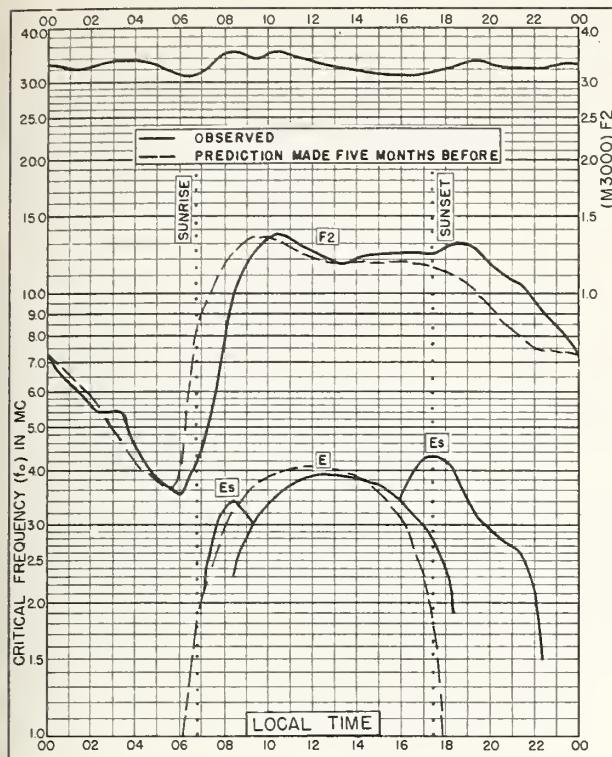


FIG. 69. RAROTONGA I.  
21.2°S, 159.8°W

JULY 1957

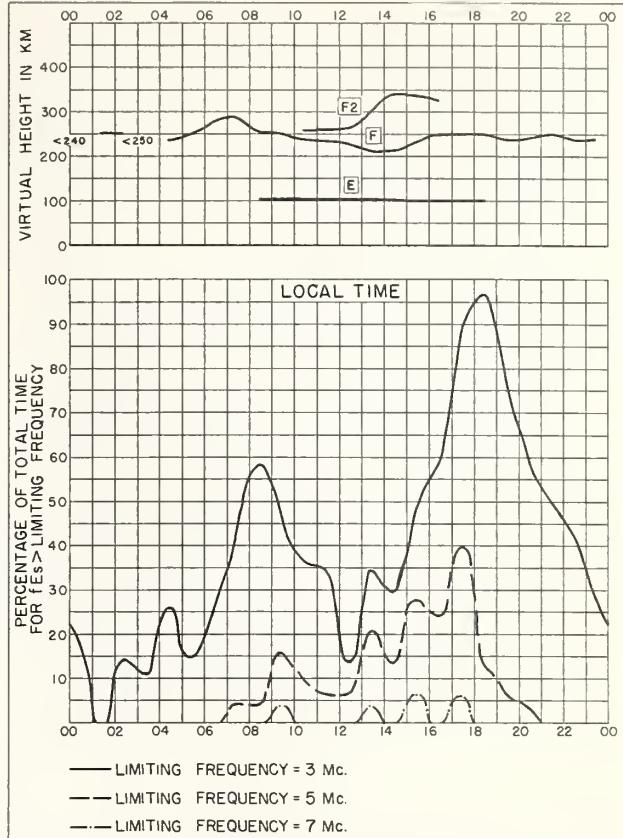


FIG. 70. RAROTONGA I.

JULY 1957

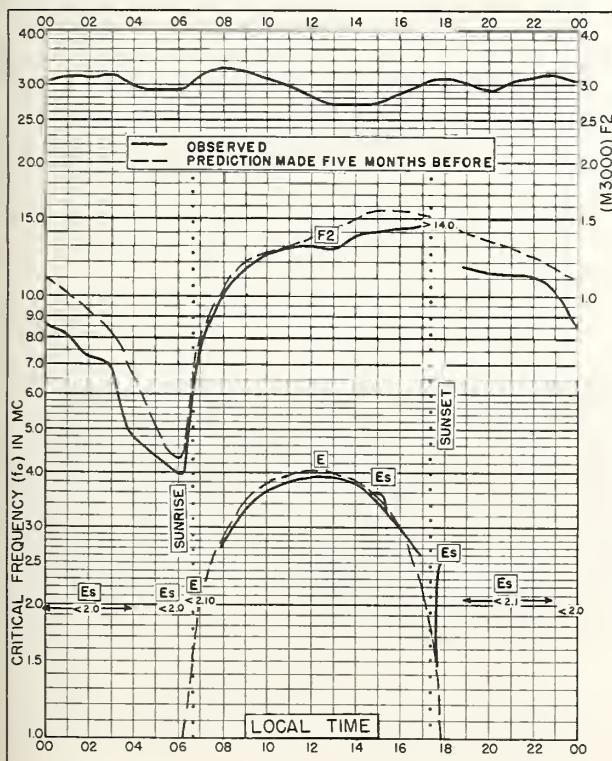


FIG. 71. SAO PAULO, BRAZIL  
23.5°S 46.5°W

JULY 1957

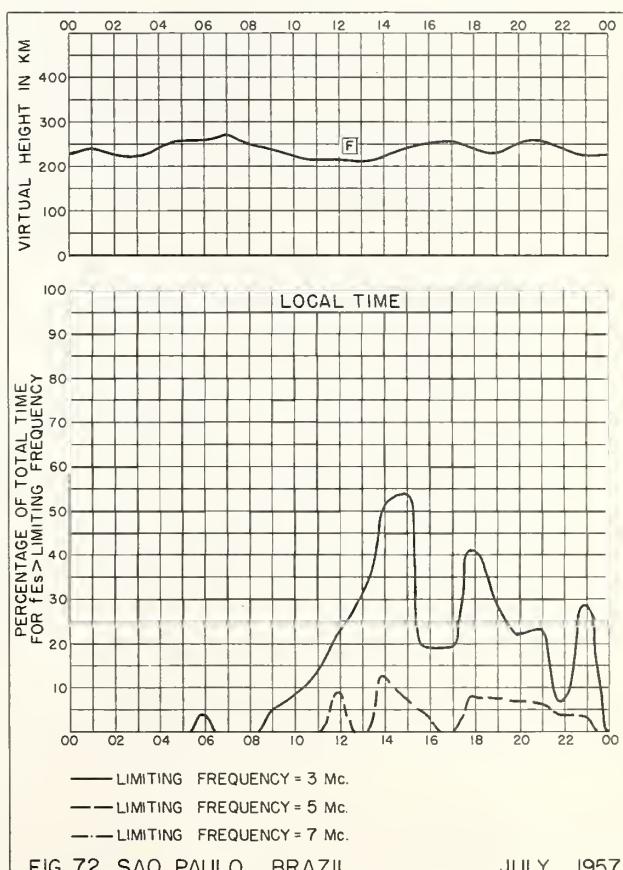
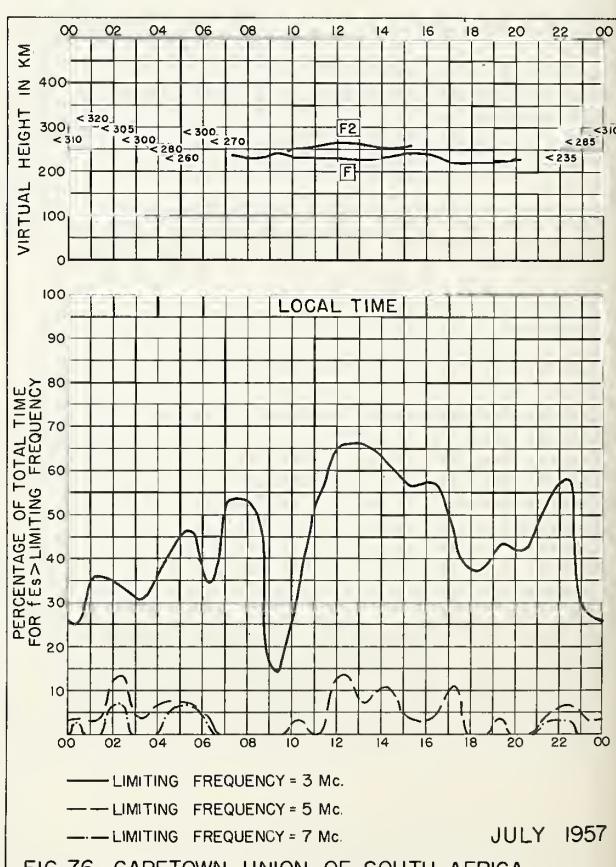
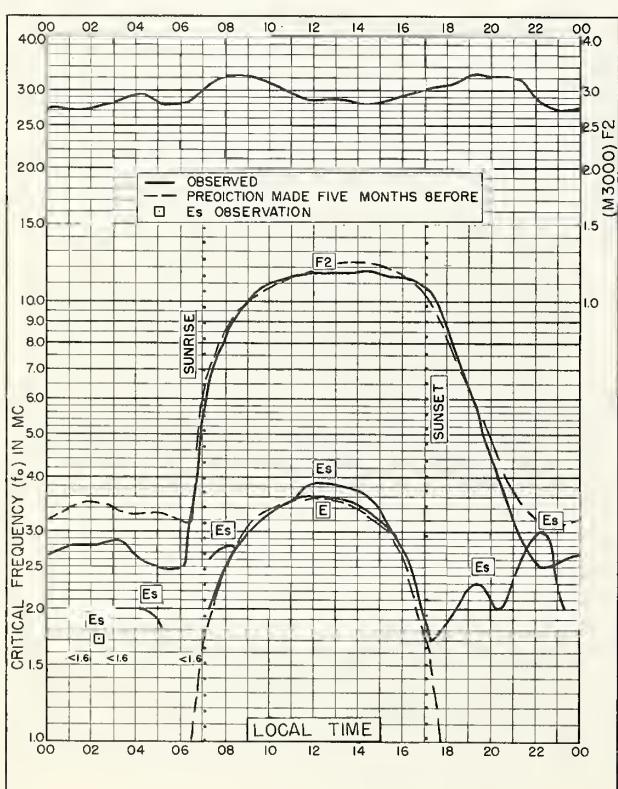
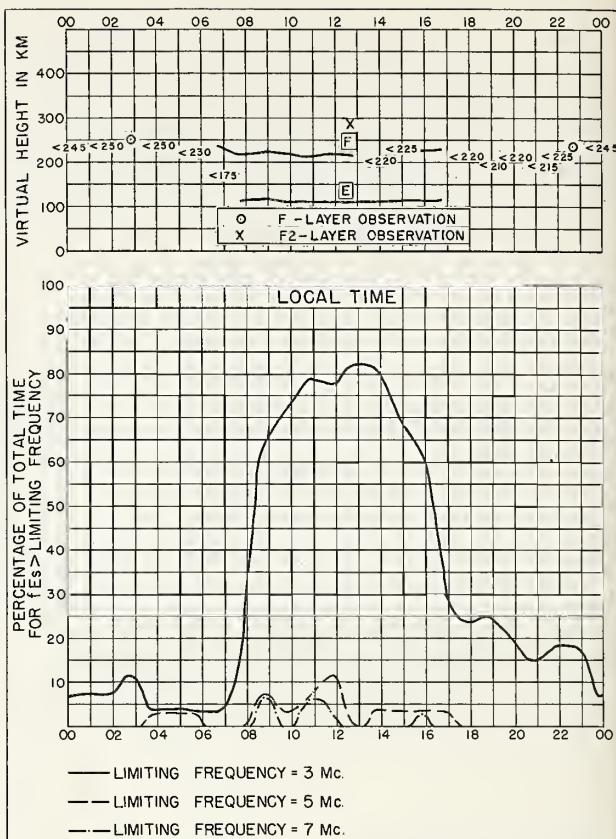
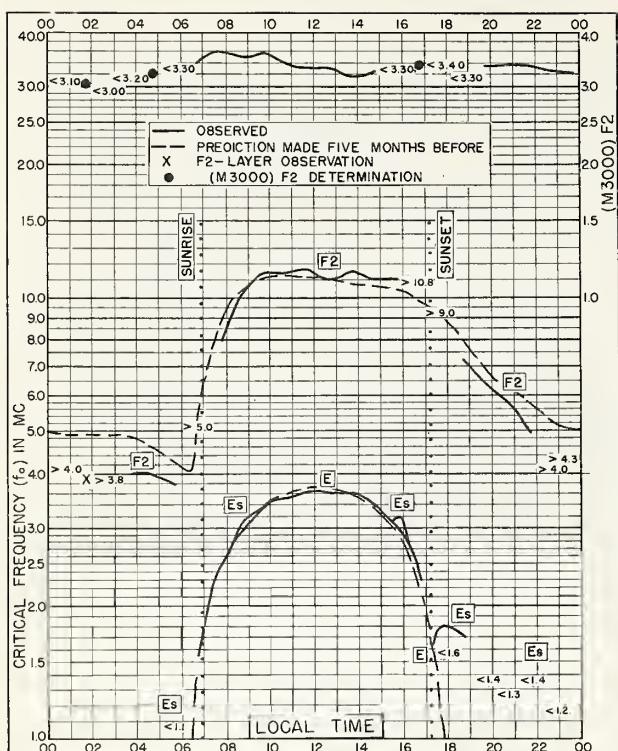
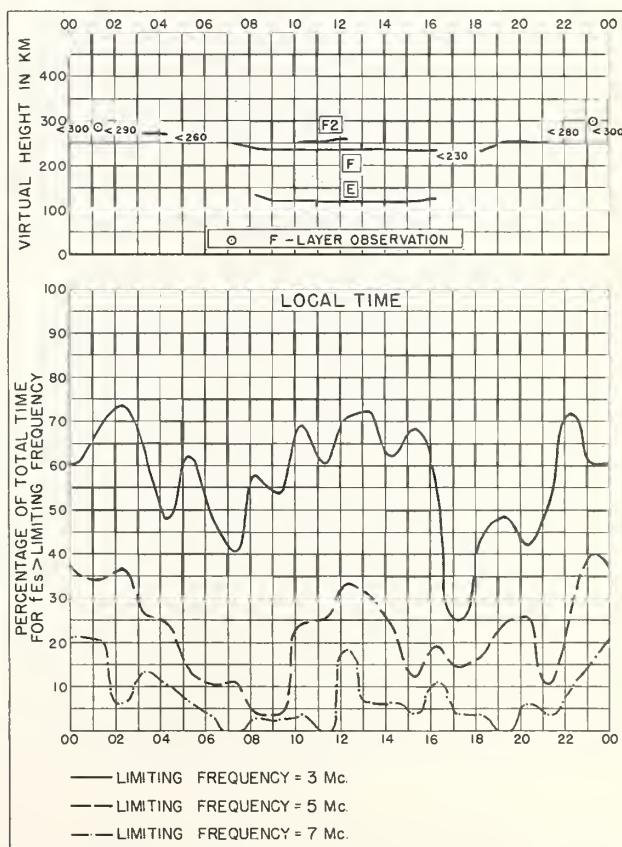
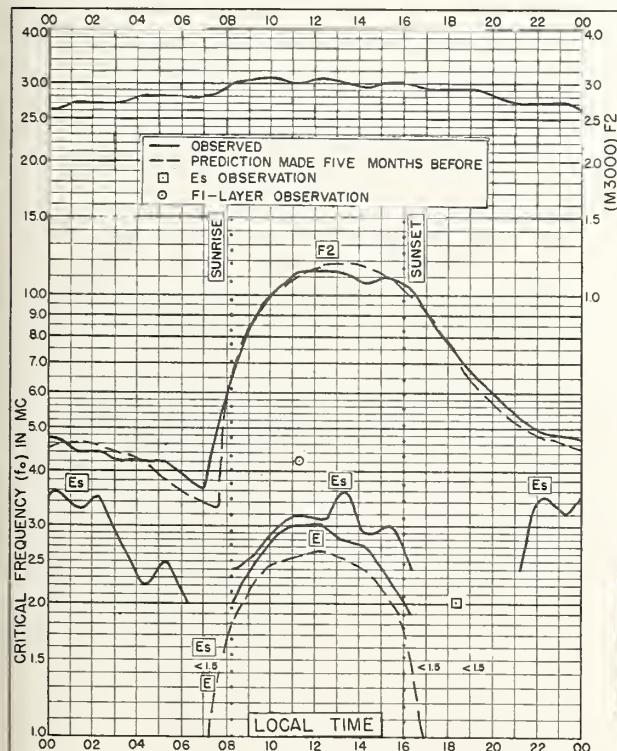
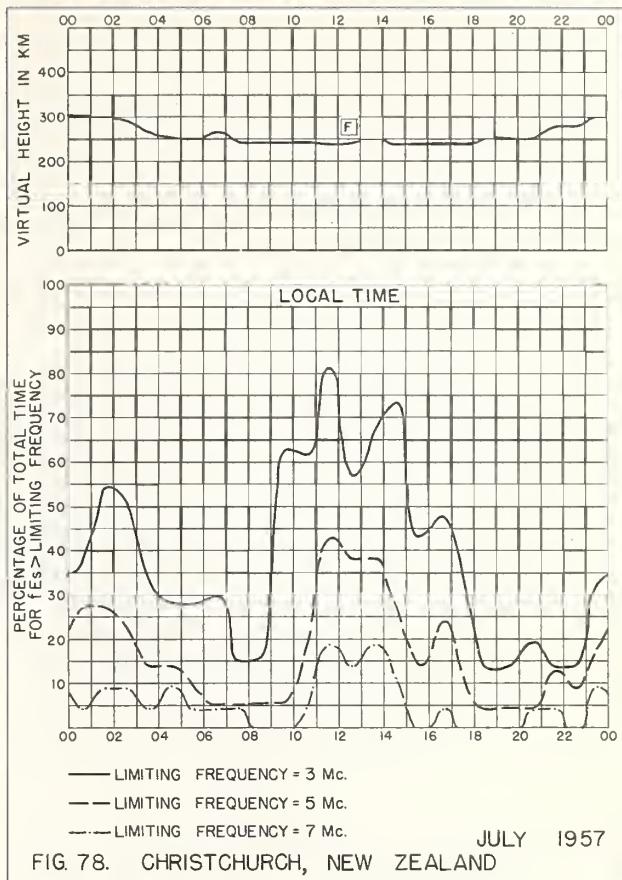
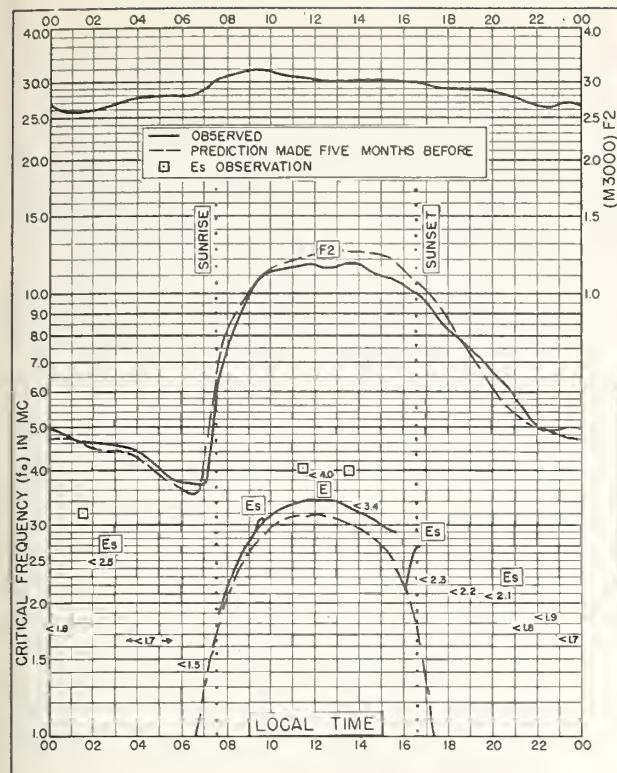
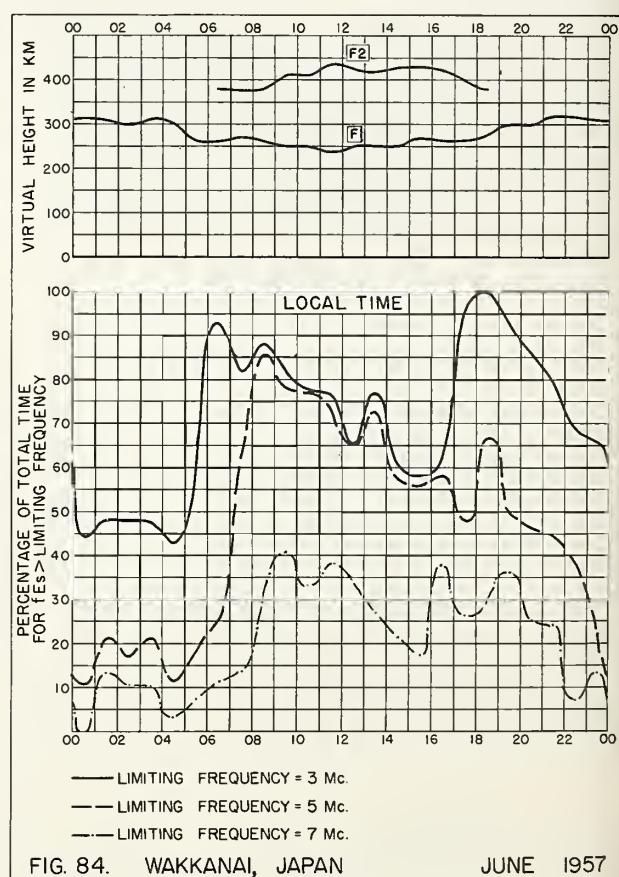
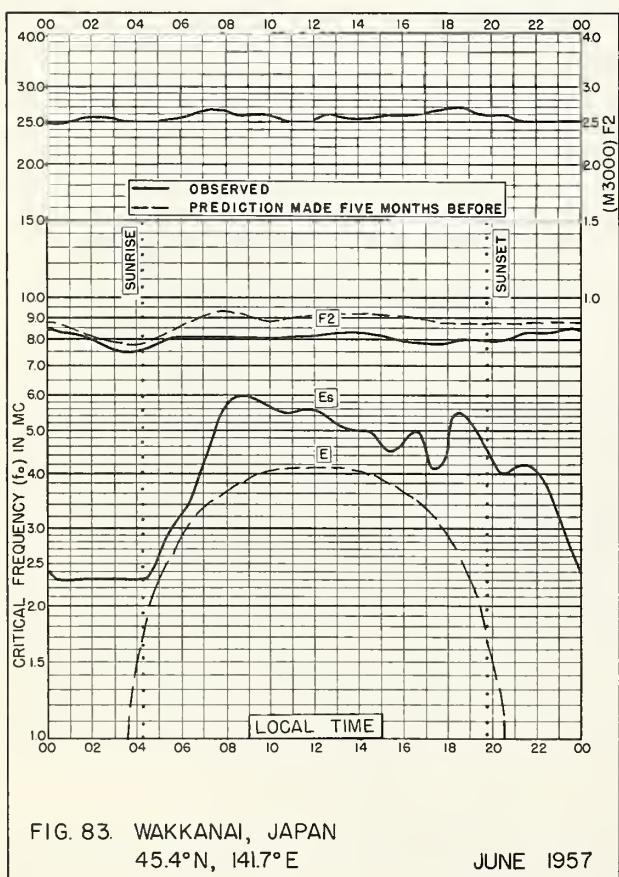
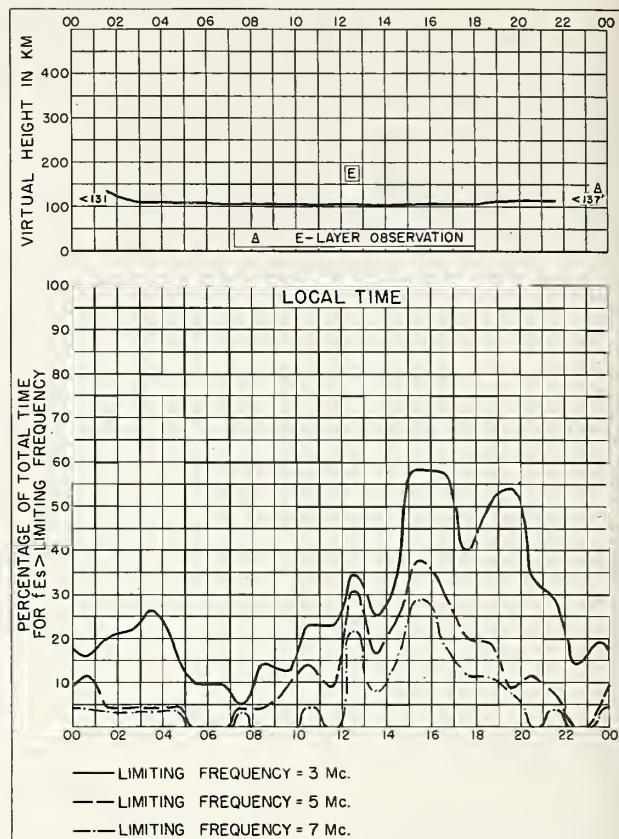
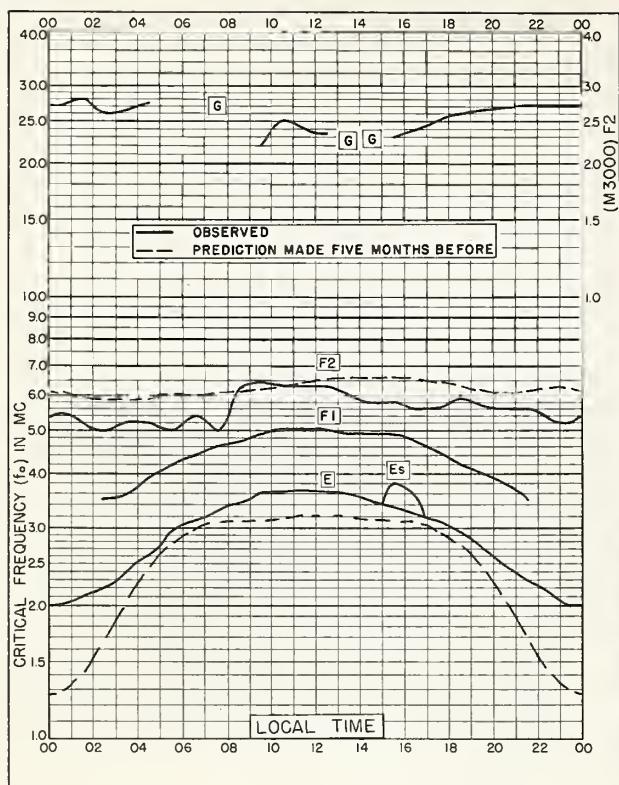


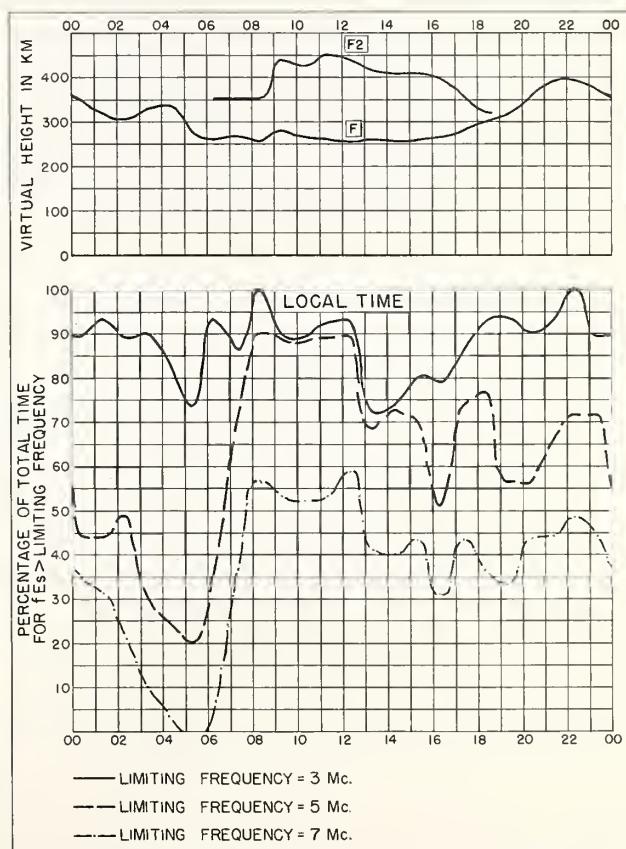
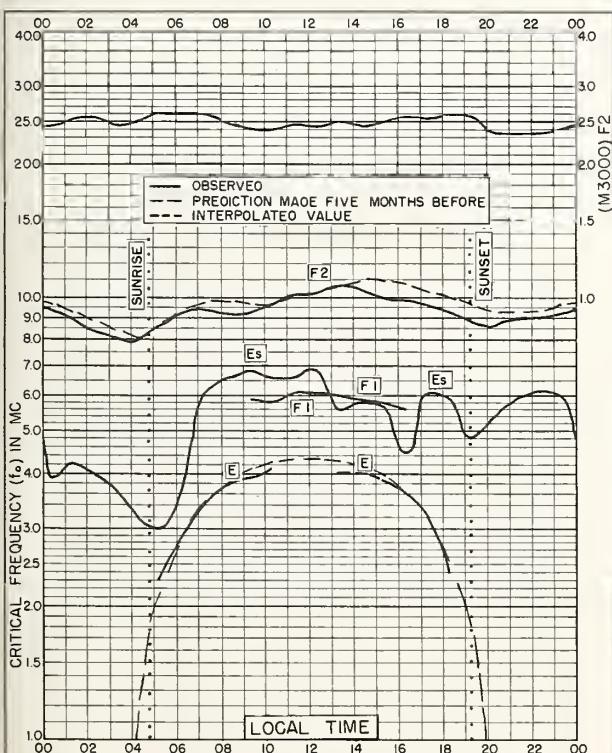
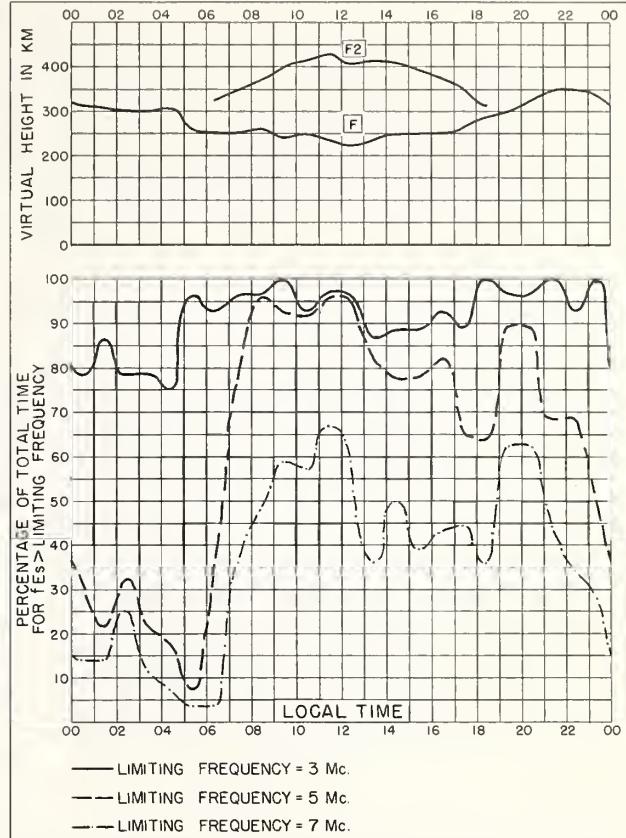
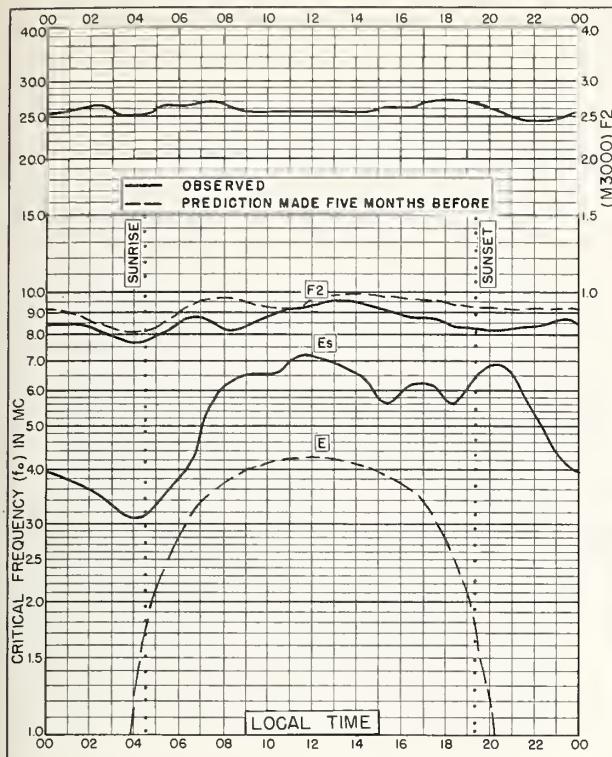
FIG. 72. SAO PAULO, BRAZIL

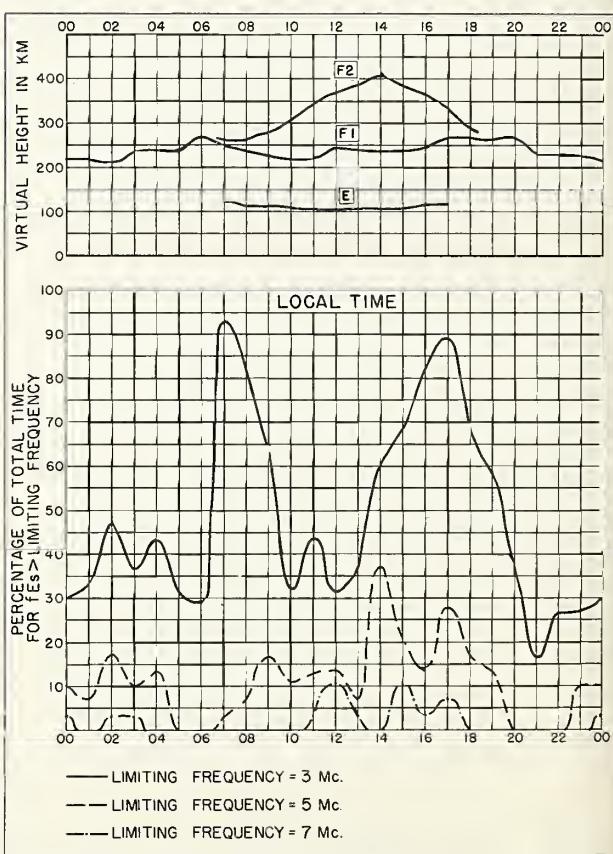
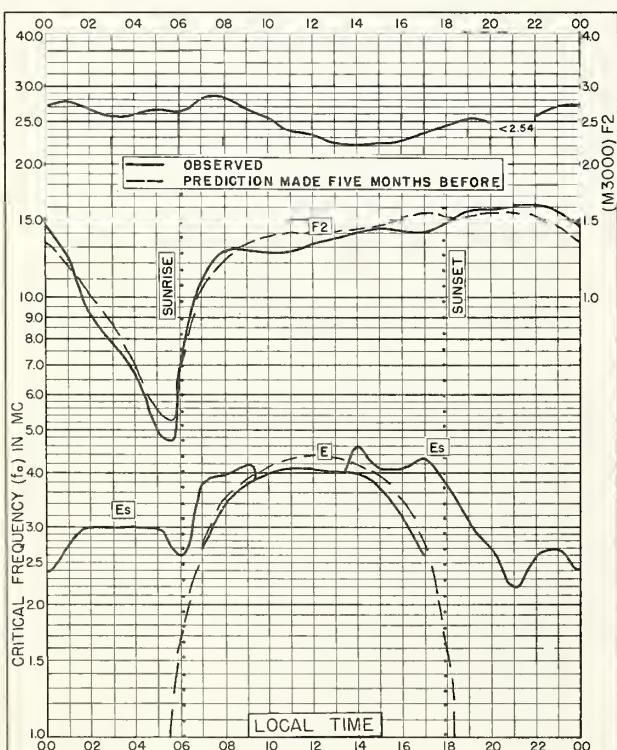
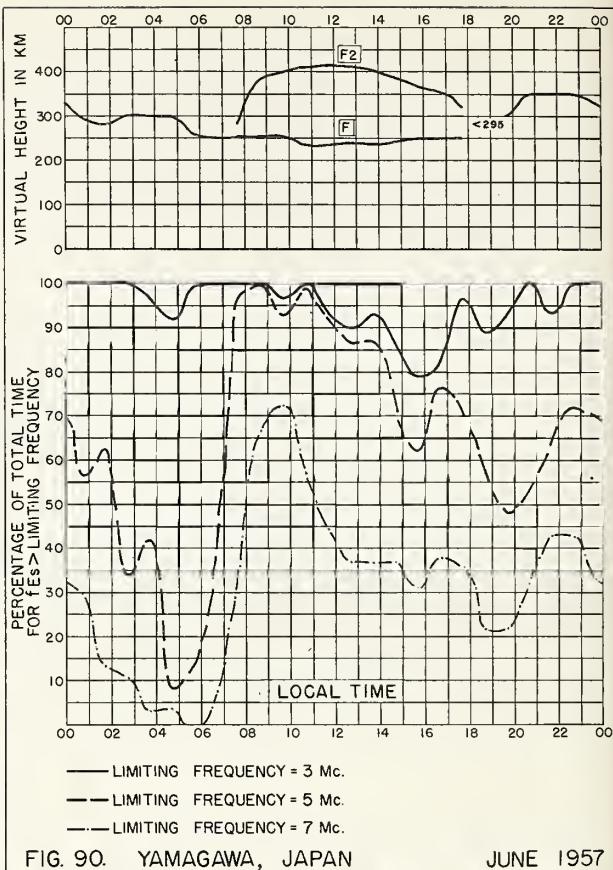
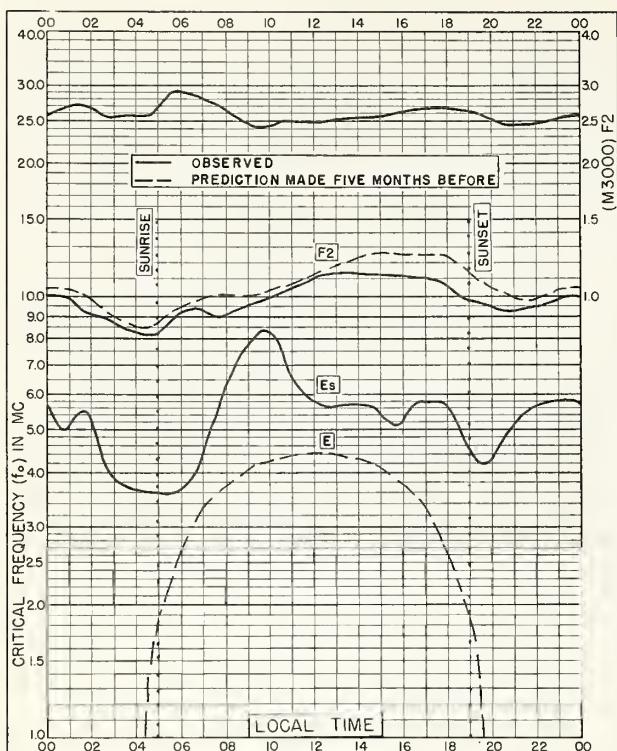
JULY 1957

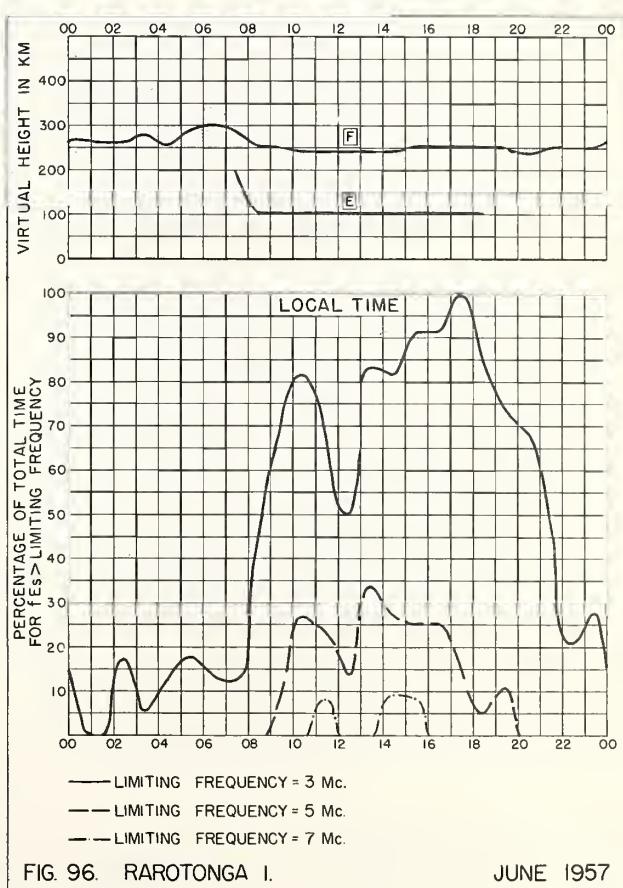
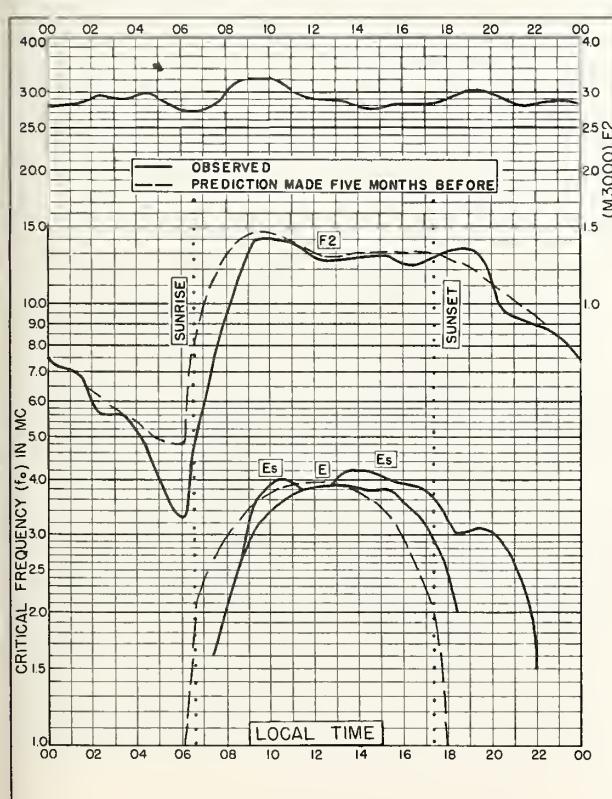
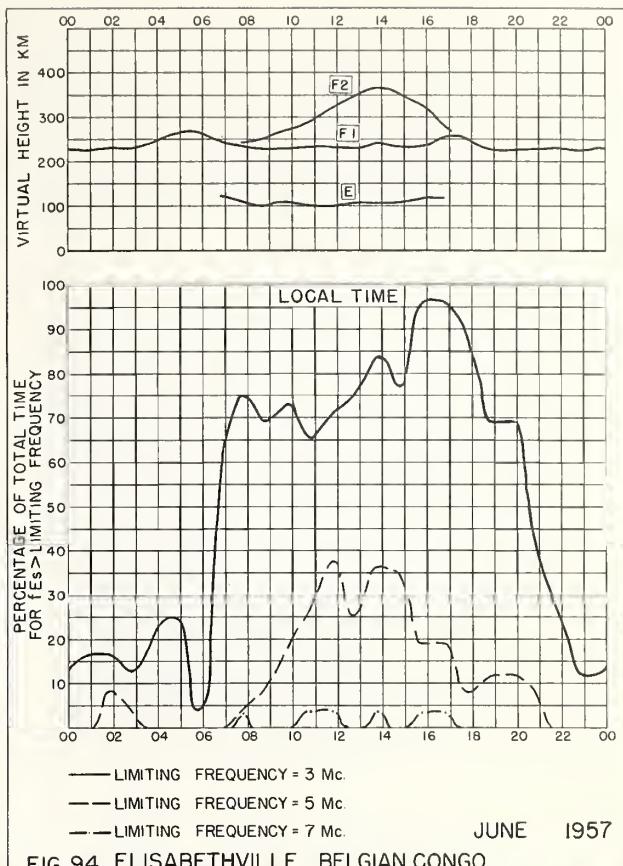
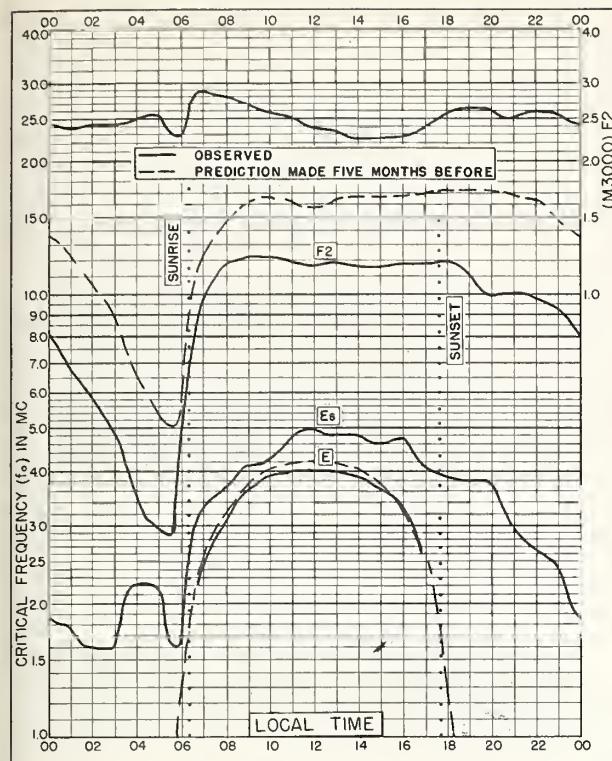


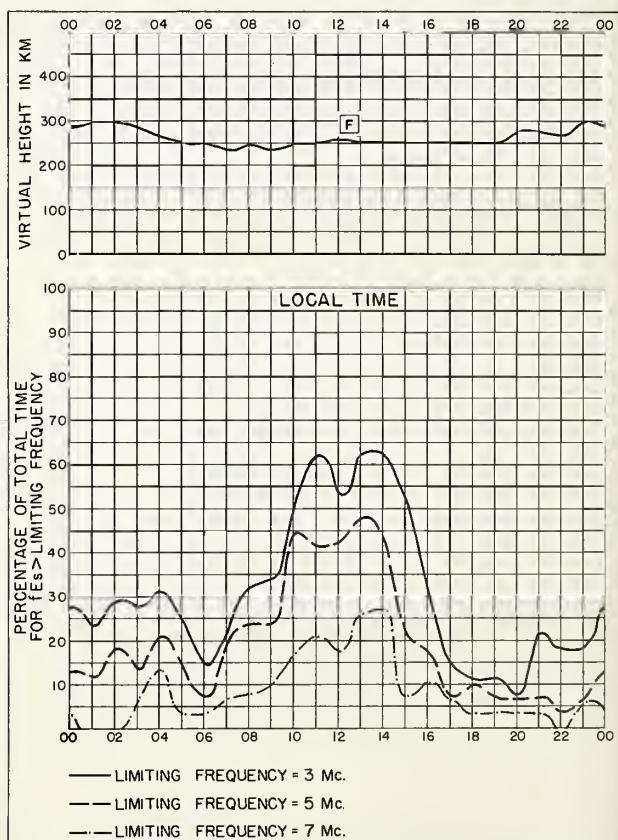
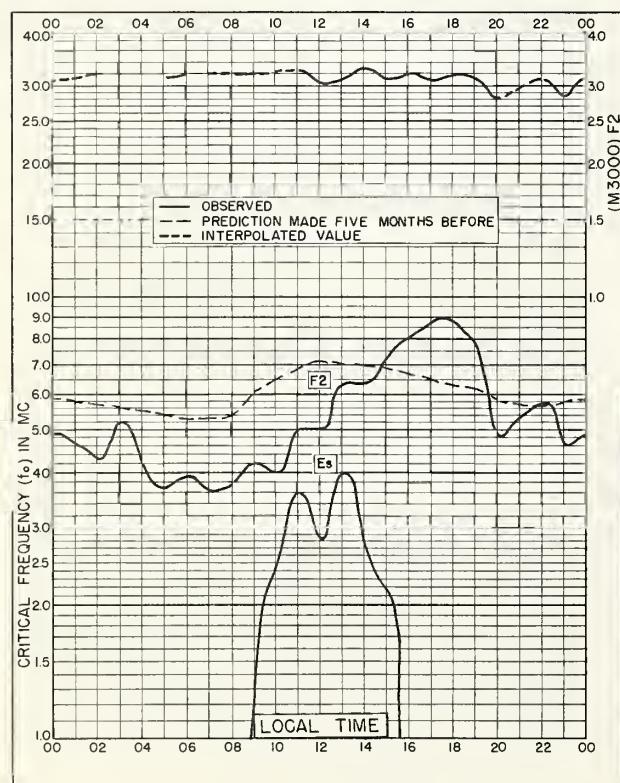
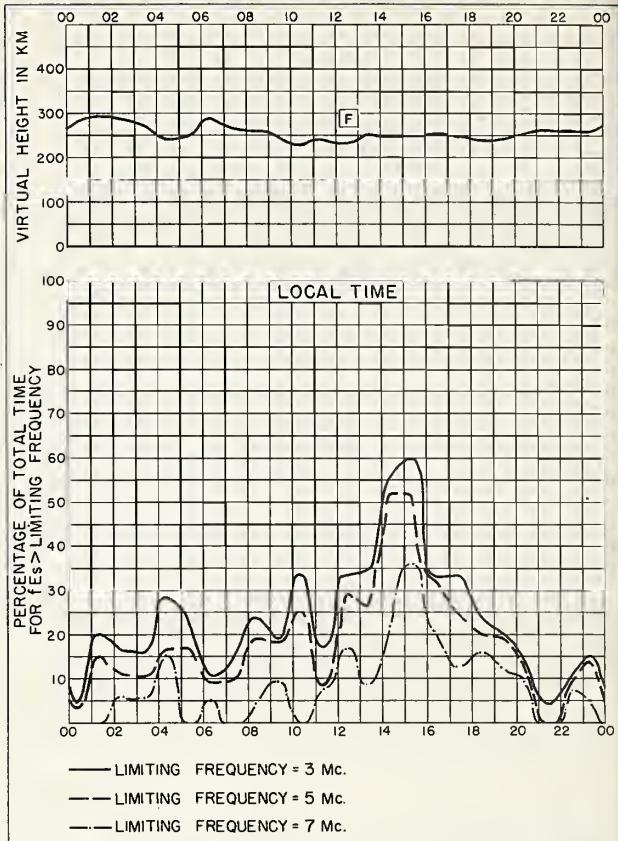
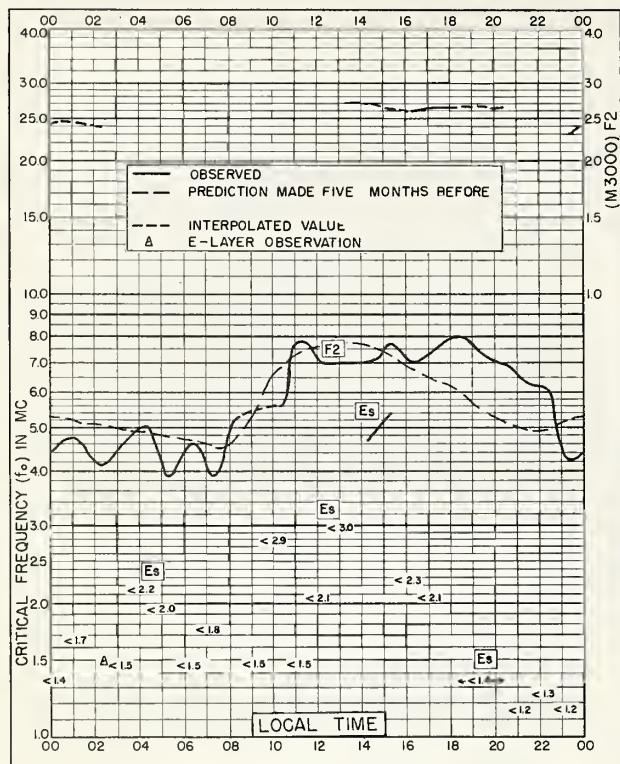












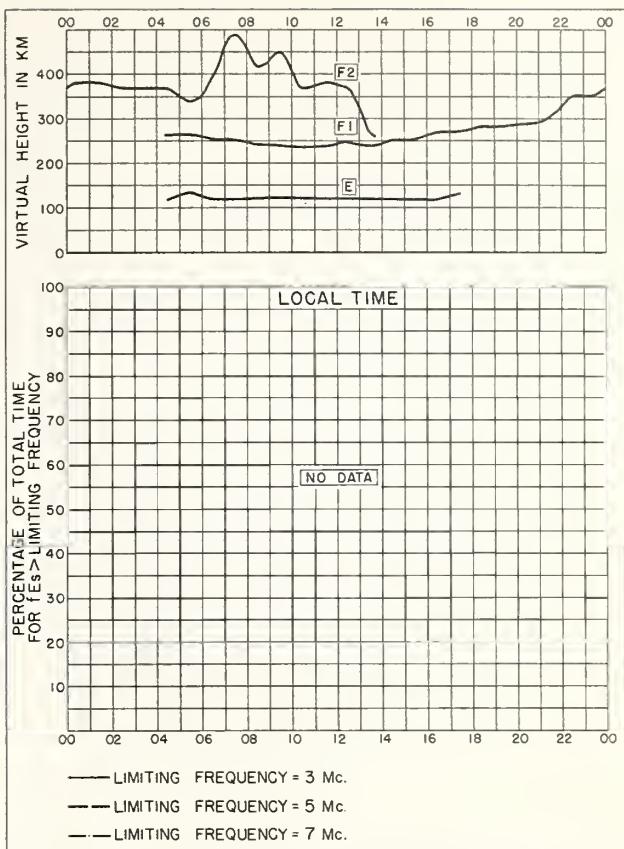
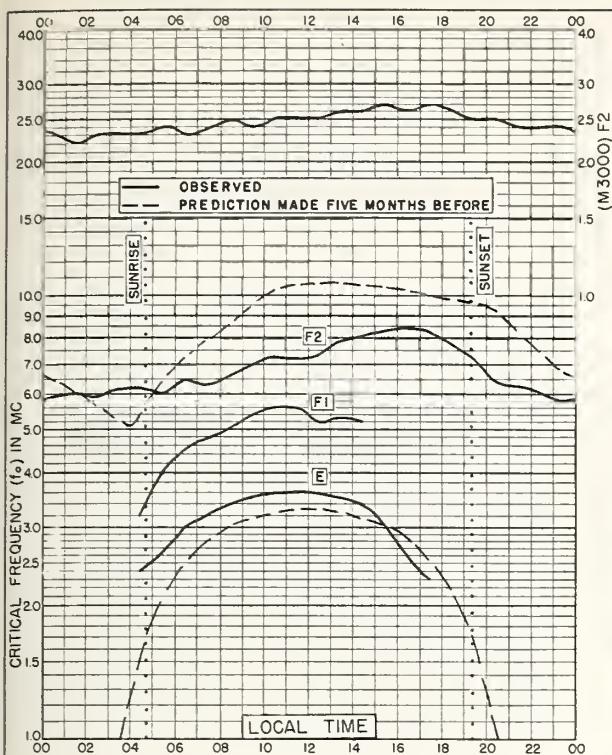


FIG. 102. PROVIDENIE BAY, U.S.S.R. APRIL 1957

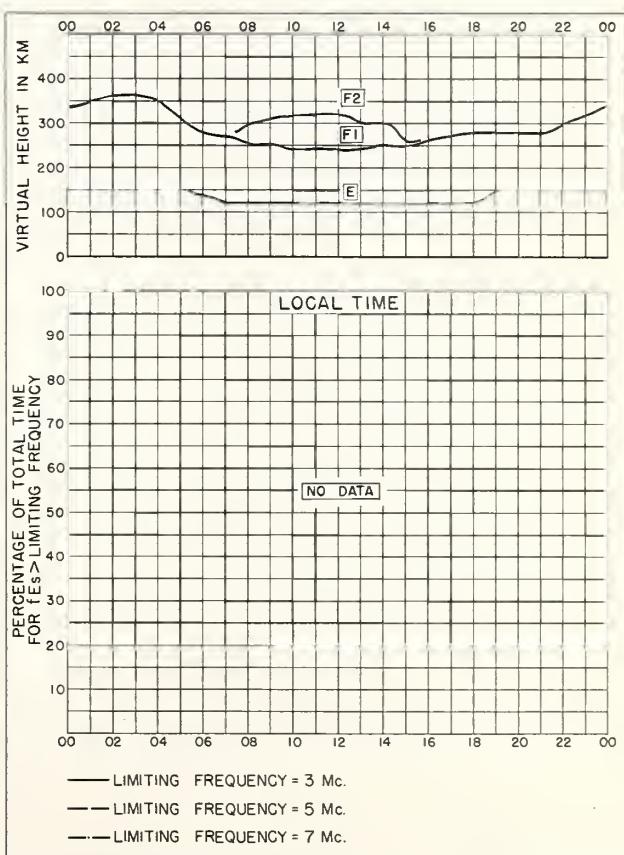
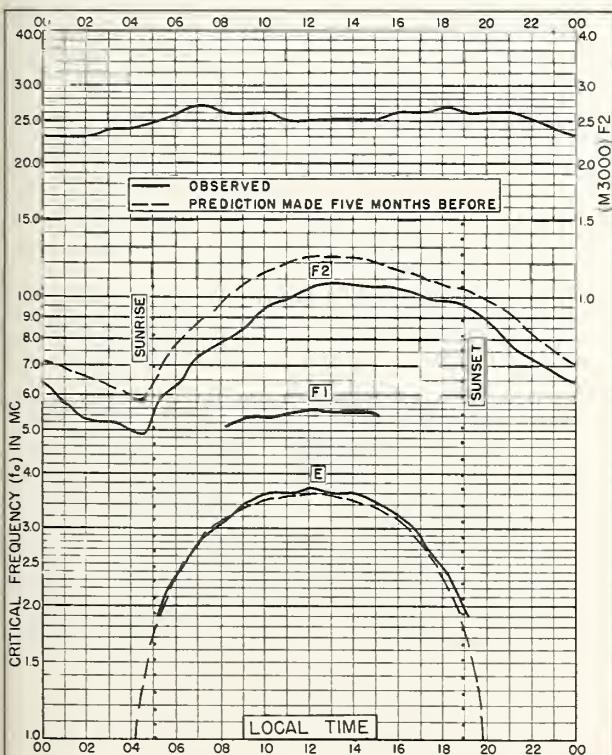
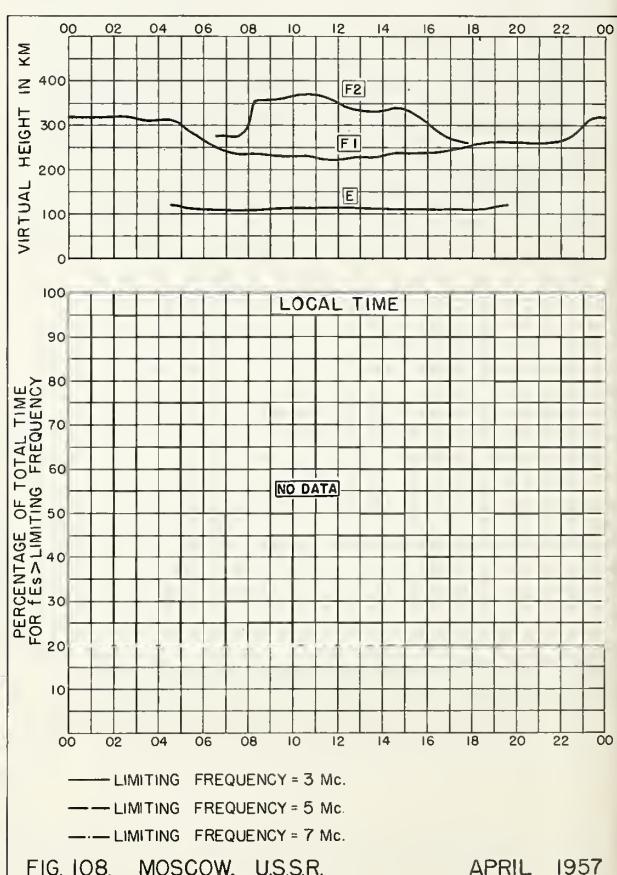
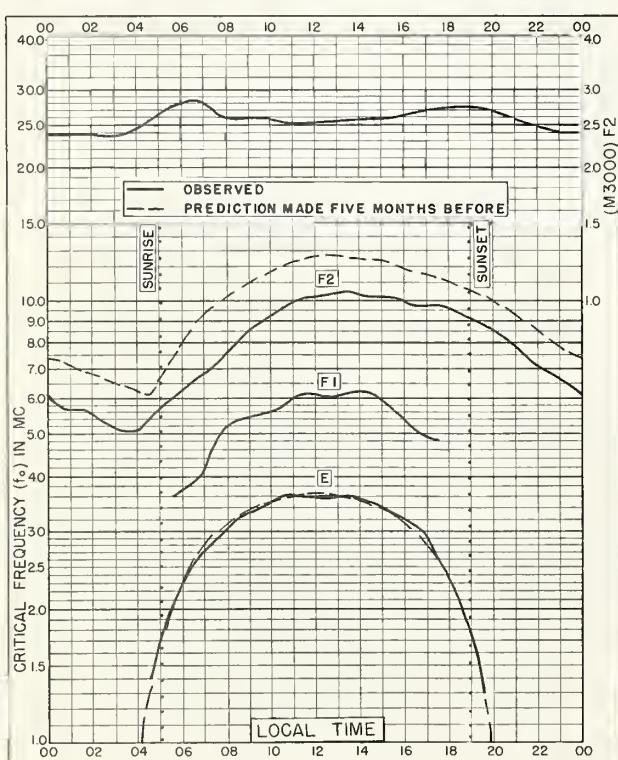
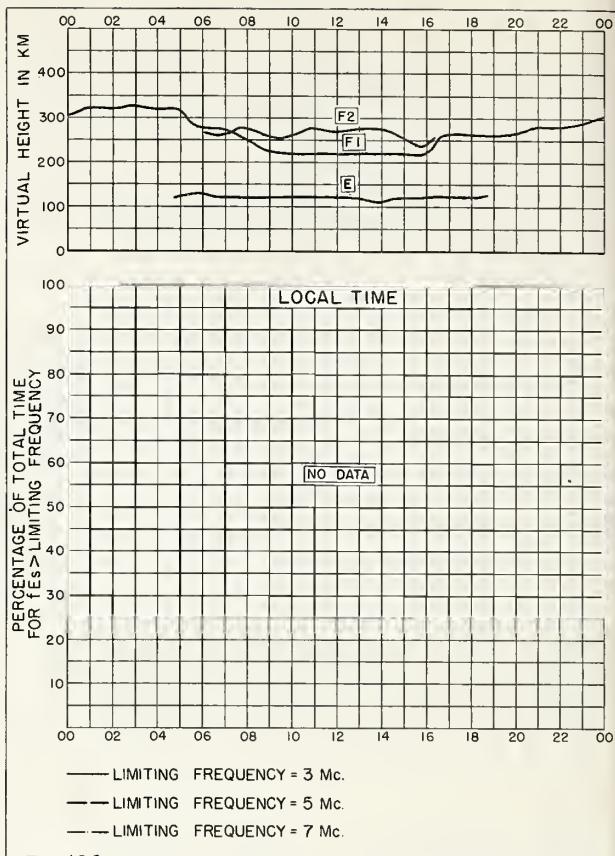
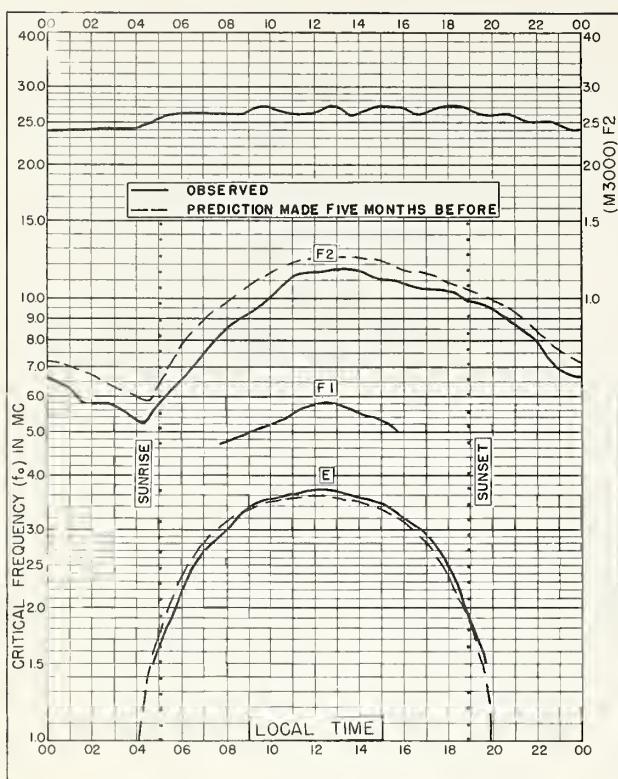
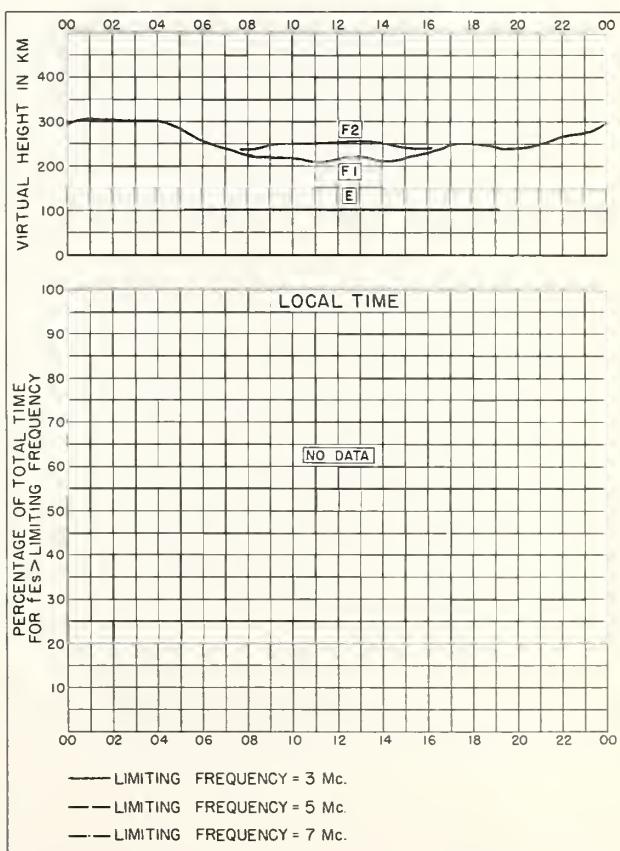
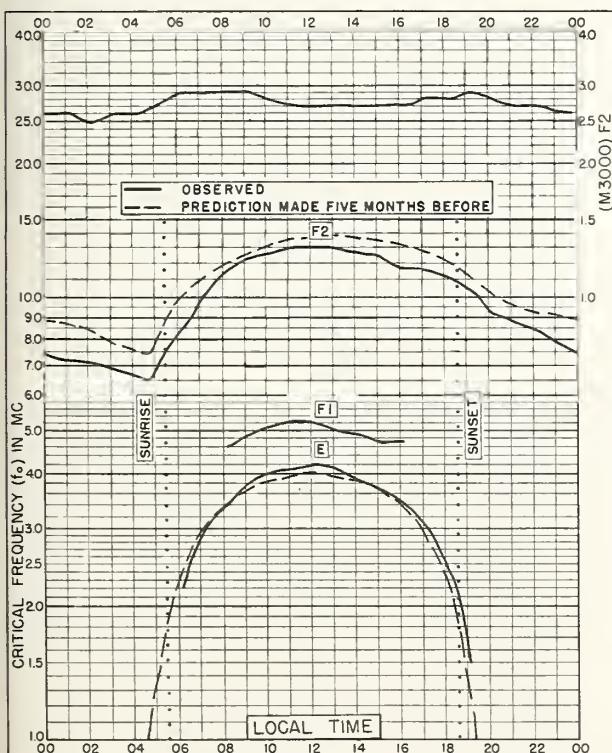
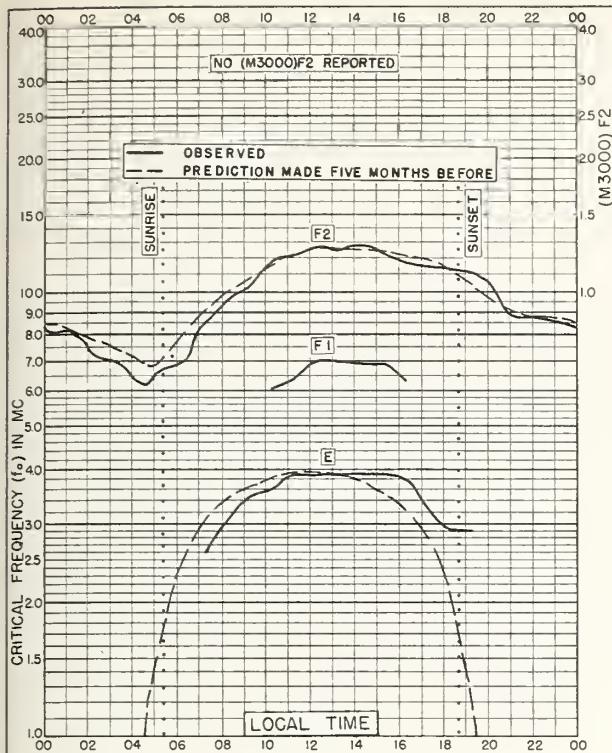


FIG. 104. SVERDLOVSK, U.S.S.R. APRIL 1957





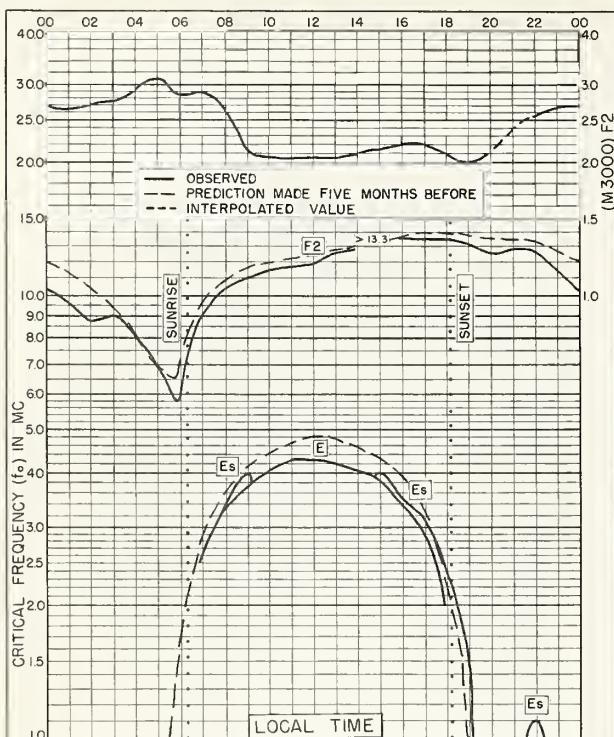


FIG. 112. SINGAPORE, BRITISH MALAYA

13° N, 103° E

FEBRUARY 1957

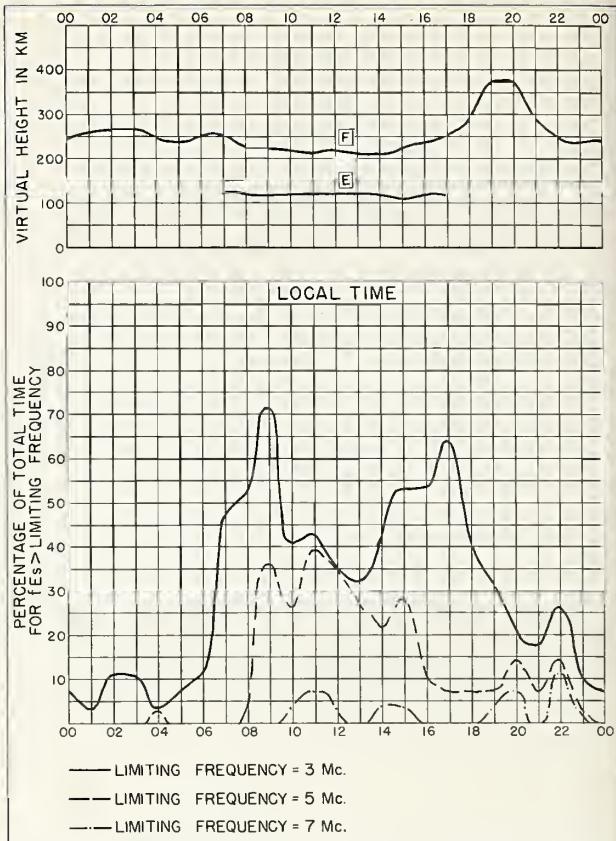


FIG. 113. SINGAPORE, BRITISH MALAYA FEBRUARY 1957

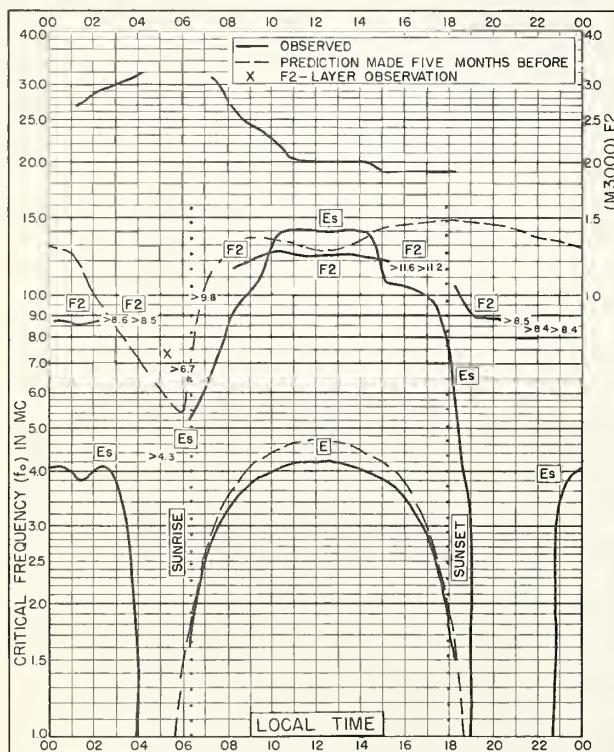


FIG. 114. IBADAN, NIGERIA

7.4°N, 3.9°E

JANUARY 1957

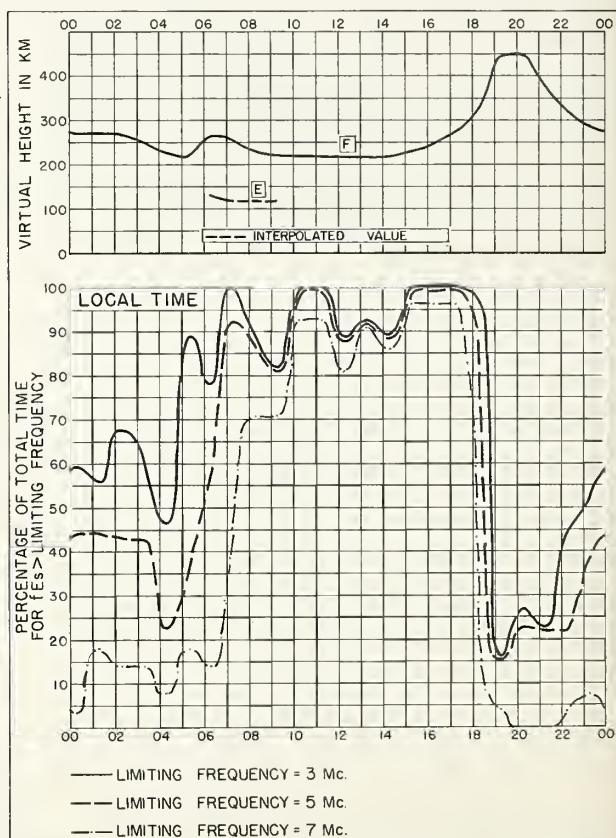


FIG. 115. IBADAN, NIGERIA

JANUARY 1957

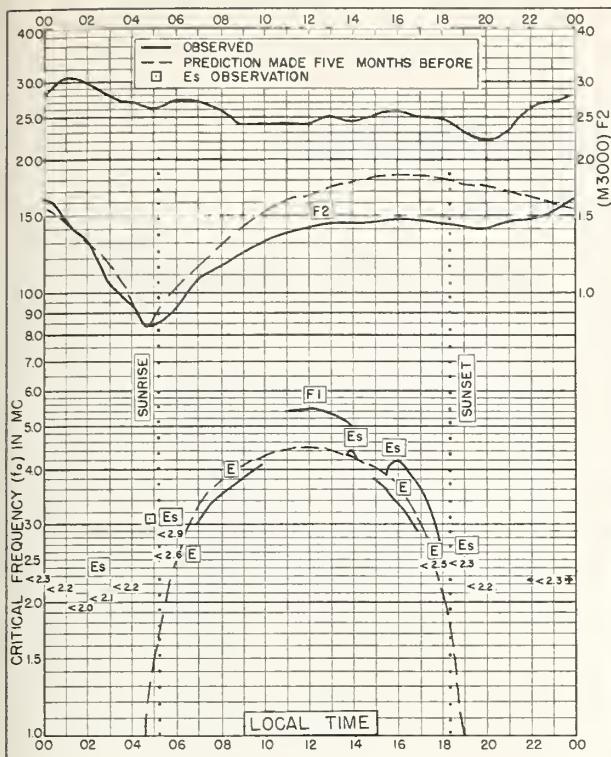


FIG. 116. SAO PAULO, BRAZIL  
23.5°S, 46.5°W NOVEMBER 1956

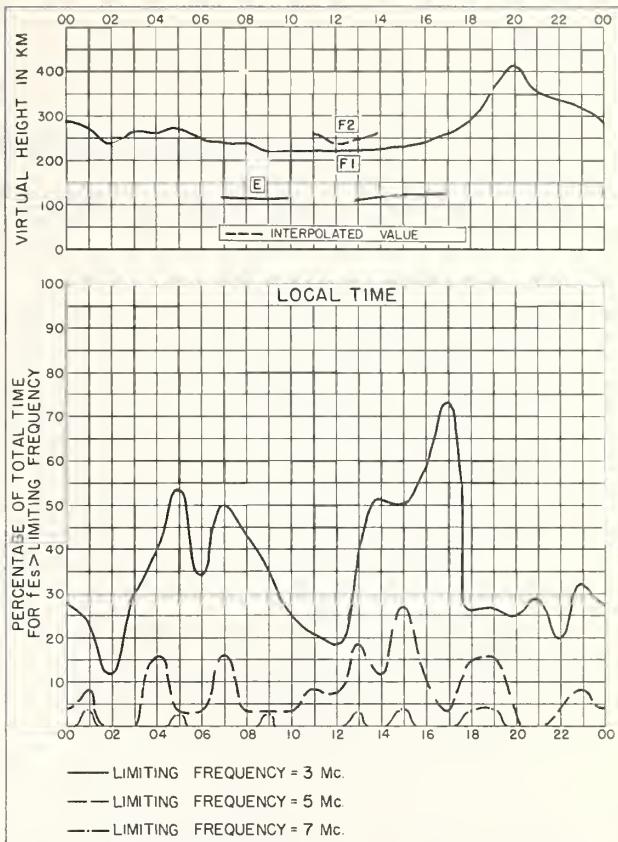


FIG. 117. SAO PAULO, BRAZIL NOVEMBER 1956

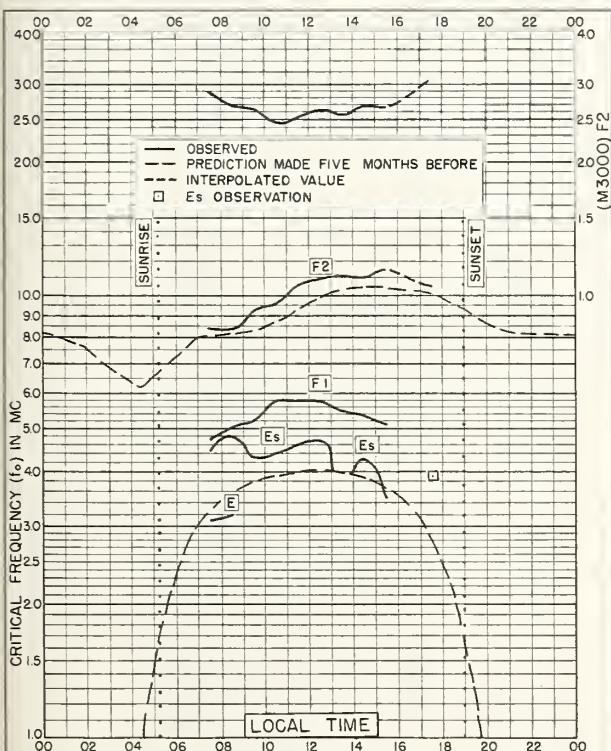


FIG. 118. QUETTA, PAKISTAN  
30.2°N, 67.0°E JULY 1956

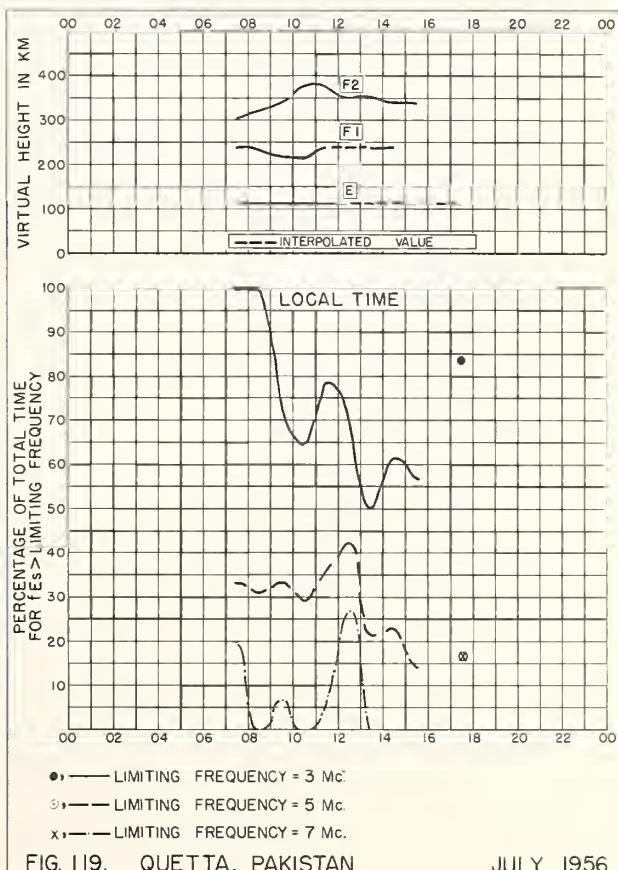


FIG. 119. QUETTA, PAKISTAN JULY 1956

Index of Tables and Graphs of Ionospheric Datain CRPL-F161 (Part A)

	<u>Table page</u>	<u>Figure page</u>
Akita, Japan		
June 1957. . . . .	17	41
Alma-Ata, U.S.S.R.		
April 1957 . . . . .	19	47
Baguio, P. I.		
July 1957. . . . .	15	35
Bogota, Colombia		
August 1957. . . . .	13	31
Budapest, Hungary		
July 1957. . . . .	14	34
Campbell I.		
July 1957. . . . .	16	39
Canberra, Australia		
August 1957. . . . .	13	31
Cape Hallett		
June 1957. . . . .	18	44
Capetown, Union of S. Africa		
July 1957. . . . .	16	38
Christchurch, New Zealand		
July 1957. . . . .	16	39
Churchill, Canada		
August 1957. . . . .	12	28
Elisabethville, Belgian Congo		
September 1957 . . . . .	11	25
July 1957. . . . .	15	36
June 1957. . . . .	17	43
Fletchers Ice I.		
September 1957 . . . . .	10	21
July 1957. . . . .	14	32
Ft. Monmouth, New Jersey		
August 1957. . . . .	13	29
Godhavn, Greenland		
August 1957. . . . .	12	27
July 1957. . . . .	14	33
June 1957. . . . .	16	40
Grand Bahama I.		
August 1957. . . . .	13	30
Graz, Austria		
October 1957 . . . . .	10	20
August 1957. . . . .	12	28
July 1957. . . . .	15	35
Ibadan, Nigeria		
January 1957 . . . . .	19	48

Index (CRPL-F161 (Part A), continued)

	<u>Table page</u>	<u>Figure page</u>
Inverness, Scotland		
July 1957. . . . .	14	33
Leopoldville, Belgian Congo		
September 1957 . . . . .	11	24
July 1957. . . . .	15	36
June 1957. . . . .	17	42
Maui, Hawaii		
September 1957 . . . . .	11	23
Moscow, U.S.S.R.		
April 1957 . . . . .	18	46
Nurmijarvi, Finland		
August 1957. . . . .	12	27
Oslo, Norway		
September 1957 . . . . .	10	22
Panama Canal Zone		
September 1957 . . . . .	11	24
August 1957. . . . .	13	30
Point Barrow, Alaska		
August 1957. . . . .	12	26
Providenie Bay, U.S.S.R.		
April 1957 . . . . .	18	45
Quetta, Pakistan		
July 1956. . . . .	19	49
Rarotonga I.		
July 1957. . . . .	15	37
June 1957. . . . .	17	43
Resolute Bay, Canada		
August 1957. . . . .	12	26
July 1957. . . . .	14	32
St. John's, Newfoundland		
September 1957 . . . . .	10	22
San Francisco, California		
August 1957. . . . .	13	29
Sao Paulo, Brazil		
July 1957. . . . .	15	37
November 1956. . . . .	19	49
Scott Base		
June 1957. . . . .	18	44
Simferopol, U.S.S.R.		
April 1957 . . . . .	19	47
Singapore, British Malaya		
February 1957. . . . .	19	48
Slough, England		
July 1957. . . . .	14	34
Sverdlovsk, U.S.S.R.		
April 1957 . . . . .	18	45

Index (CRPL-F161 (Part A), concluded)

	<u>Table page</u>	<u>Figure page</u>
Thule, Greenland		
August 1957. . . . .	11	25
Tokyo, Japan		
June 1957. . . . .	17	41
Tomsk, U.S.S.R.		
April 1957 . . . . .	18	46
Tromso, Norway		
September 1957 . . . . .	10	21
Upsala, Sweden		
October 1957 . . . . .	10	20
Wakkanai, Japan		
June 1957. . . . .	16	40
Washington, D. C.		
September 1957 . . . . .	11	23
Watheroo, W. Australia		
July 1957. . . . .	16	38
Yamagawa, Japan		
June 1957. . . . .	17	42

---

## CRPL Reports

[A detailed list of CRPL publications is available from the Central Radio Propagation Laboratory upon request]

*Daily:*

Radio disturbance forecasts, every half hour from broadcast stations WWV and WWVH of the National Bureau of Standards.

Telephoned and telegraphed reports of ionospheric, solar, geomagnetic, and radio propagation data.

*Semiweekly:*

CRPL—J. North Atlantic Radio Propagation Forecast (of days most likely to be disturbed during following month).

CRPL—Jp. North Pacific Radio Propagation Forecast (of days most likely to be disturbed during following month).

*Semimonthly:*

CRPL—Ja. Semimonthly Frequency Revision Factors For CRPL Basic Radio Propagation Prediction Reports.

*Monthly:*

CRPL—D. Basic Radio Propagation Predictions—Three months in advance. (Dept. of the Army, TB 11-499-, monthly supplements to TM 11-499; Dept. of the Air Force, TO 31-3-28 series). On sale by Superintendent of Documents.\* Members of the Armed Forces should address cognizant military office.

CRPL—F. (Part A). Ionospheric Data.

(Part B). Solar-Geophysical Data.

Limited distribution. These publications are in general disseminated only to those individuals or scientific organizations which collaborate in the exchange of ionospheric, solar, geomagnetic or other radio propagation data or in exchange for copies of publications on radio, physics, and geophysics for the CRPL library.

The publications listed above may be obtained without charge from the Central Radio Propagation Laboratory, National Bureau of Standards, Boulder Laboratories, Boulder, Colorado, unless otherwise indicated. Please note that the F series is not generally available.

---

*Circulars of the National Bureau of Standards pertaining to Radio Sky Wave Transmission:*

NBS Circular 462. Ionospheric Radio Propagation. \$1.25.

NBS Circular 465. Instructions for the Use of Basic Radio Propagation Predictions. 30 cents.

NBS Circular 557. Worldwide Radio Noise Levels Expected in the Frequency Band 10 Kilocycles to 100 Megacycles. 30 cents.

NBS Circular 582. Worldwide Occurrence of Sporadic E. \$3.25.

These Circulars are on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Members of the Armed Forces should address the respective military office having cognizance of radio wave propagation.

---

\* For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. Price 10 cents (single copy). Subscription Price: \$1.00 a year; 25 cents additional for foreign mailing.

